A Database Publication

electron user

Vol. 5 No. 6 April 1988 £1.25

MEMORY MAP

A complete guide to the Electron's rom and ram

Go-Pig: An exciting board game for one or two players

Dozer Disorder: Educational fun for young children

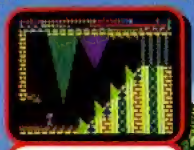
Shadow Ram: Make the most of your Slogger Master Ram Board

Arcade Corner: The first two levels of Codename Droid mapped for you

Arcade Game Creator

A library of machine code routines to enable you to write your own arcade games

Quest


The Quest is under way

Making Sweet Music

Visiting the Elephant House

Battling through a Killer Horde

Leaping over Vats of Acid

Interrogating a Computer Terminal

Passing through Verdant Foliage

Going for a Swim?

Walter Cobra and the Quest for the Golden Dragon

You are Walter Cobra, a clever but absent-minded young lad who spends many hours indulging in two favourite hobbies: exploring, and inventing. One day, to your surprise, you stumble across a faded old map which indicates the route to a buried object marked as "The Golden Dragon". You recognise the starting-point on the map as being a wishing-well located a couple of miles away from your home. Full of anticipation, you decide to begin your quest the following day.

The next day, as the sun is rising you excitedly get out of bed, pack your rucksack with a few provisions, and then don your jet-boots — an astounding invention which enables you to fly for short periods of time. You amble over towards the wishing-well and slowly climb down the walls of the well. It's quite deep, but finally you reach the bottom. You then suddenly realise that you have left behind a very important item, the map.

You decide to press on regardless. You remember some of the places shown on the map: "The Music Room", "The Joke Shop", "The Chapel" ; but, bearing in mind the size of the map, this quest will surely be the greatest challenge of your life!

Nearly 100 Screens full of Tantalising Puzzles and Curious Adversaries

BBC Dual Cassette	£9.95	Acorn Electron Dual Cassette	£9.95
BBC Micro 5¼" Disc	£11.95	BBC Master Compact 3½" Disc	£14.95

(Compatible with the BBC B, B+ and Master Series computers)

PRIZE COMPETITION

£100 is the first prize in our competition, with 20 congratulatory certificates for runners-up.
To enter the competition, you must locate the Golden Dragon, and write to us describing the final messages that you receive.
Closing Date: 30th June, 1988.

SUPERIOR SOFTWARE Limited

ACORNSOFT

Dept. Q 4, Regent House, Skinner Lane, Leeds LS7 1AX. Telephone: 0532 459453

Please make all cheques payable to "Superior Software Ltd"

24 HOUR TELEPHONE ANSWERING SERVICE FOR ORDERS

OUR GUARANTEE

- All mail orders are despatched within 24 hours by first-class post
- Postage and packing is free
- Faulty cassettes and discs will be replaced immediately

(This does not affect your statutory rights)

CONTENTS

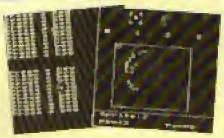
Vol. 5 No. 7 April 1988

electron user

News
Up to the minute news and views from the ever-expanding world of the Acorn Electron.
5

Hardware projects
If you're troubled by wind, then add an anemometer to your Electron weather station.
9

Software
Our panel of experts casts a critical eye over the latest releases.
13

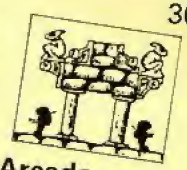


Sprites
You'll find a whole host of advanced print routines in Part 3 of our machine code games series. Plus an offer not to be missed: Arcade Game Creator.
20

Machine code
Part 2 of our beginner's guide to assembly language programming introduces some common mnemonics.
25

Memory map
The first in a new series providing a complete run down on the Electron's 64k of memory.
27

Pascal
We round off this guide introducing this fascinating language with a look at some longer programming examples.
30



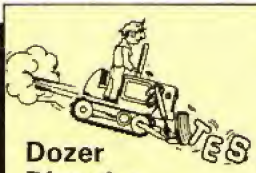
Arcade Corner
The first of a two-part map of Superior Software's Codename Droid – Striker's Run Part 2.
32

Go-Pig
Play this fascinating board game with a friend, or try your luck against the Electron.
34

Adventures
More hints, tips, clues and magic spells from our resident wizard. Plus Twin Kingdom Valley map Part 3.
40

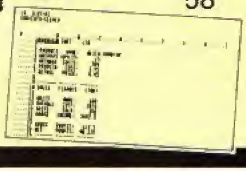
Shadow ram
A new series for Slogger Master Ram Board owners kicks off with a short utility to make use of the 26k of hidden memory.
45

Mail
A selection from the many lively, interesting letters you've been sending us over the past few weeks.
47



Dozer Disorder
Improve your spelling with this fun educational game for children.
55

Viewsheet
Part 2 of our guide to spreadsheets shows how it can be used to forcast a company's expenses, profits and losses.
58



Customised characters
Cram more on to your screens with this amazing squashed character set utility.
60

Bargains galore!

Don't miss our special offers on Pages 51 to 53

Managing Editor **Derek Meakin**

Group Editor **Alan McLachlan**

Features Editor **Roland Waddilove**

Production Editor **Peter Glover**

Reviews Coordinator **Pam Turnbull**

Promotions Editor **Chris Payne**

Advertising Sales **John Snowden** **Peter Babbage**

Published by Database Publications Ltd
Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Telephone: 0625 878888 (Editorial, Admin, Advertising). 0625 879940 (Subscriptions).
T/Gold Mailbox: 72:MAG001. Prestel: 614568383. Telex: 265871 MONREF G. Quoting Ref. 72:MAG001.

ABC 37,575 January-June 1988

News trade distribution:
Diamond-Europress Sales and Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

Printed by Carlisle Web Offset.

Electron User is an independent publication. Acorn Computers Ltd, are not responsible for any of the articles in this issue or for any of the opinions expressed.

Electron User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

Subscription rates for 12 issues, post free:

£16 UK
£23 Europe & Eire
£38 Overseas

ISSN 0952-3057

© 1988 Database Publications Ltd. No material may be reproduced in whole or in part without written permission. While every care is taken, the publishers cannot be held legally responsible for any errors in articles or listings.

See us on stand 70 at BBC Show, Umist Manchester

PRES

VIEW CARTRIDGE . . . the Acornsoft word processor for the Electron and Plus 1. Inc. full documentation. £14.95
VIEWSHEET CARTRIDGE . . . the Acornsoft spreadsheet for the Electron and Plus 1. Inc. full documentation. £14.95
VIEW & VIEWSHEET . . . both products as above *special price*. £22.00
LISP CARTRIDGE . . . the Acornsoft language cartridge for the Electron and Plus 1. ..... £9.99

ELECTRON ADVANCED USER GUIDE . . . further reading and information for the Electron user. £3.95
ELECTRON ASSEMBLY LANGUAGE . . . book by Bruce Smith containing many examples of how to program in assembler. £2.95
Software on disc for the above 3.5" ADFS £3.50 – 5.25" DFS £2.50

ACCESSORIES
Plus 3 2nd drive adaptor. £7.95
3.5" Library box (holds 10 discs) £2.95
3.5" Library box (holds 40 discs) £9.95
Electron Power Switch (provides new switched power connector) £3.50

ADVANCED PLUS 6 . . . a fully buffered 6 ROM expansion module for the Electron user. AP6 is fitted inside the advanced Plus 1 or a modified Acorn Plus 1 (when used with the Acorn Plus 3, 5 ROM sockets are available). All sockets are designed to accept either ROM/EPROMS or RAM chips. A further feature is the optional AP7 upgrade ..... £33.00+VAT (£37.95)
UPGRADE SERVICE for the original Acorn Plus 1 to Advanced Plus 1 and AP6. This will provide all the benefits of AP6 and also includes the printer circuit modification for some modern printers. (AP6 can be fitted to original Plus 1 by users with soldering experience) for upgrade service add £7.00 + VAT to AP6 price ie ..... £40.00+VAT (£46.00)
This price includes modification, fitting AP6, testing and return postage. Address for returning your Plus 1.
P.R.E.S. Service Department, PO Box 34, Bradford BD17 6DE

PRICE BREAKTHROUGH

THE ADVANCED PLUS 3

Now you can turn your Electron (& +1) into a full disc system – no more waiting for tape loading or 'bad block'/'data ?' messages. A.P.3. gives you . . .

1. A 1770 interface
2. 80 track 3.5" disc drive (320k capacity)
3. Separate PSU (Conforms to BS)
4. Acorn ADFS
5. Welcome disc
6. Utilities
7. Full documentation

All the advantages of the original Plus 3 PLUS extra ROM socket and possible upgrade to A.P.4. from ACP.
All this without dramatically increasing the required desk space!

EXTRA BONUS
3 games on disc – SNAPPER – DRAUGHTS – REVERSI

COMPLETE PACKAGE ONLY £99+VAT (£113.85)

SPECIAL PACKAGE of Advanced Plus 1 & A.P.3. £149.95 inc.

COMING SOON

ADVANCED PLUS 7 . . . upgrade for AP6 allows for 2 banks of 16k battery backed sideways ram which can be fully write protected.
HYBRID'S MUSIC 5000 . . . as widely used on the BBC computers has been fully versioned for the Electron & Plus 5.
USER PORT CARTRIDGE . . . a new single user port in standard size cartridge at budget price ..... £T.B.A.
1MHZ bus, . . . a new single 1MHZ bus in standard size cartridge at a budget price ..... £T.B.A.

DISC DRIVES
Cumana 5.25" dbl/sided 40/80 track, switchable, inc. psu. £149.00
Cumana 5.25" sing/sided 40 track, inc. psu. £129.00
Cumana 3.5" dbl/sided 80 track, inc. psu. £129.00
PRES special 3.5" sing/sided 80 track, inc. psu. ..... *ONLY* £59+VAT. (£67.85)

ADVANCED PLUS 1 . . . The plus 1 is the main expansion for the Electron. It provides the Centronics parallel printer, printer port, joystick interface and 2 cartridge slots into which go ROM cartridges including View, Viewsheet, Pascal, Logo and our own popular AP4 disc upgrade. £49.95

DISCS
3.5" 10 in plastic library box – ideal for Plus 3 users £19.95
5.25" 10 dble/sided dble/dens. £12.99
5.25" 10 sing/sided sing/dens. £8.99
5.25" Twin Gift Pack £1.49

ADFS VERSION 1.1 FOR THE ELECTRON
Suitable for existing Plus 3 or A.P. 4 users. This new version has the software fixes for Zysyshelp, write protect disable and compaction. Also Winchester code has been replaced with 'patches' for future enhancements! 16K ROM and full documentation..... £19.95 + VAT (£22.55)
ADFS E00 . . . at last regained memory used by ADFS suitable for AP4 or Plus 3 users with 32k of sideways ram supplied on disc with documentation 5.25" DFS £19.95
3.5" ADFS £22.95

PRINTER
Printer ideal for Electron Plus 1. Panasonic KX-P1081 Graphic Epson Compatible NLQ ready to connect including cable, delivery and VAT £179.00

ADVANCED QTR. MEG RAM
Hi-Tech cartridge (Normal size) containing an incredible 256K of S.Ways RAM although it could be used to store many pages of sideways ROM Images its primary and best use is as a RAM disc supported by our Electron ADFS. Now Databases (ie Viewstore) can perform at breathtaking speed (over twice as fast as some other 1 Meg silicon discs) and animation becomes a reality. £79.95

ADVANCED ROM ADAPTER 2
An Acorn approved cartridge containing a card with special 'zero' profile sockets that allow you to fit compatible 8k or 16k EPROMS/ROMS. The cartridge is fully enclosed providing complete protection for your ROMS. Simple to use – No switching – complies fully to the Acorn (sideways) Rom filing system.
"The best ROM cartridge is by far the ARA 2...A&B Dec 86 ..... £14.95

ADVANCED BATTERY BACKED RAM
For Master and Electron users. A battery backed 32K RAM cartridge, A.B.R. is a self contained cartridge containing two 16K Pages of sideways RAM with a rechargeable battery backup. Each 16K page can be individually locked by software. Supplied with new Pres software support. To include loading software, ROM save, print buffer and a new improved MAKEROM utility. "Its a superb addon and a must for all serious Electron Users" – *EU June.* £39.99

Please send order to:-
P.R.E.S. LTD.,
6 Ava House, High Street,
CHOBHAM, Surrey, England.
GU24 8LZ. Tel: 0276 72046
(Mail order only)
All our prices include UK delivery & VAT

Product Qty @ Total

Name .....
Address .....
.....
.....
Postcode .....
Tel: ..... I enclose payment for £ .....
(in event of any query– please include your tel. no.) Credit Card No. ..... Exp date ..... (Ref E104)

electron user NEWS

New games label being launched

A MAJOR international publisher has joined forces with a new software house to launch an exclusive entertainments label for the Electron.

To be known as Mandarin, it will combine the marketing muscle of the Europress Group, parent company of Database Publications, and a crack new team of games writers known as Powerhouse Software – plus a £1 million budget.

And the end product aims to be exclusive games for the discriminating player.

"We believe that Powerhouse Software's programming skills, together with Mandarin's knowledge of the marketplace, abilities in printing, and its understanding of the need to get products out on time, will be an unbeatable combination", says Steve Benfield of Powerhouse.

Mandarin's involvement with the innovative games software house is the first of a series of joint ventures.

"We find ourselves in the position that, unlike many other publishers, we don't have to rush out titles to maintain cash flow", says Chris Payne, spokesman for the new venture.

"Mandarin couldn't be more sound financially – we have £1 million in the kitty – so we are in a superb position to be able to pick and choose not only our partners, but also just what products we decide to release.

"It is our aim that our label will become synonymous with quality, providing the Rolls Royce of software games for the Electron.

"And what better way to start than with the brilliant new team at Powerhouse?"

The first package due for release by the new venture will be Icarus, a spectacular space adventure game for one or two players, devised by Julian Avis, author of the bestseller Dunjunz.

Its scenario sees the Starship Icarus plummetting towards the Sun, and the only hope of averting the impending cataclysm is for the player to teleport on board and regain control.

The fast action game has 20 levels of excitement, with a unique split screen facility which means that a player can compete on his or her own or enlist the help of a friend.

In all, the Powerhouse team spent three months coding, followed by another three months of play testing by a group of enthusiastic games players to fine tune Icarus and make it as addictive as possible. Price £9.95 on cassette.

First release . . . Icarus

SHOW WILL BE LAUNCHING PAD

HUNDREDS of software and hardware bargains, plus exciting demonstrations of the latest Acorn technology, can be seen at the May Electron & BBC Micro User Show, to be held at the New Horticultural Hall, Westminster, London.

Already the list of bargains is impressive, and many exhibitors have promised that the number of discounts will be bigger than ever – with reduced prices on software, printers, discs and modems.

And as always the show will be the launching pad for a number of exciting new Electron products.

Companies such as Slogger, Advanced Computer Products and Jaffa Systems say that they are all working on a range of new add–ons for the Electron that will further enhance the machine's capabilities and power.

Because of the nature of the products, they are keeping the developments a closely guarded secret until the show, but the companies say that the new items represent a huge financial investment and commitment to the Electron.

Throughout the show there will be demonstrations of Acorn In Action. A team of experts will be demonstrating the very latest computer technology and showing how it is helping to bring new hope to sufferers of the eye disease glaucoma.

There will also be a

Turn to Page 6 ►

History goes on record

A HUNDRED years of local history are being catalogued by an enthusiastic 15-year-old Electron user at Port Sunlight Village, Merseyside.

Dawn Freeman started to gather information about the historic village six months ago when she found out that the Queen was to visit the area as part of its centenary celebrations.

Since then she has spoken to many of the older residents to find out what the village was like, and how it has changed over the years.

"I have enjoyed the project immensely", said Dawn. "Although I am not doing it for any specific reason, I feel that the information I have gathered will be of benefit to future researchers.

"The Electron has been a great help to me in tabulating all of the data. I mainly use the View word processor, but for facts and figures I have found the Viewsheet package very handy".

Port Sunlight was built in 1888 by Viscount Leverhulme for his workers. Since then the garden village has proved to be a tremendous attraction to architects and social historians the world over.

Although fairly well documented, the work that Dawn is doing on the Electron provides another valuable source of reference material.

"Once the project is finished I intend to give a copy to the local heritage centre. Had it not been for the Electron I doubt if I would have undertaken such a task because of the tremendous amount of writing involved", she said.

Electron's good turn

LEARNING many of the skills that boy scouts and cubs need to know is being made a lot easier with an Electron.

Members of the First Heaton Moor scout group – claimed to be the oldest in the world – at Stockport, near Manchester are tackling some of the knottier problems of scouting with a program written by group leader Craig Jones (above).

"I've had an Electron for about a year and I have been trying to think of new ways of making learning more fun for the cubs and scouts", said Craig.

"The program is a simple question-and-answer routine that tests the knowledge of the group members. It asks questions on such topics as tying knots, map reading and first aid.

"When the correct answer is given the program moves on to the next section, but if they get it wrong then a diagram is displayed with an explanation of the answer".

The First Heaton Moor Scout Group recently celebrated its 80th birthday. It was founded only two weeks after Baden Powell launched the movement in 1908.

Where other groups may have fallen away over the years, Heaton Moor has survived because of its enthusiasm of its members, and the thirst for new ideas.

Calling all micros . . .

IT could only happen in America . . . New York-based Communications Specialties has released a TV transmitter for computers.

The company says that it is now possible to plug your Electron into the device – Screen Sender – and transmit the signal up to 1000 feet away.

A feed is taken from the machine's monitor socket and connected to the transmitter. A repeater system is used should the signal be required for broadcasting over a greater distance.

However, the device from Communications Specialties (0101 516 499 0907) doesn't come cheap. The unit retails for $249, with the repeater costing an extra $246.

FROM PAGE FIVE

spectacular computer-controlled laser light show, as well as demonstrations of a program developed by an amateur astronomer to detect distant galaxies.

And as if that was not enough, you will also be able to see your own heartbeats displayed, measure your manual dexterity, and hear your own voice backwards – all courtesy of Acorn technology.

So whatever your interest there will be lots to see, do and buy at the Electron & BBC Micro User Show, at the New Horticultural Hall, Westminster, London, from May 13 to 15. For details of cut price admission tickets see page 31.

THE GALLUP CHART TOP 10 ELECTRON SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	7	COMBAT LYNX *Alternative*	1.99
2	3	SOCCER BOSS *Alternative*	1.99
3	2	PAPERBOY *Elite*	9.95
4	1	AROUND THE WORLD IN 40 SCREENS *Superior*	6.95
5	5	FOUR GREAT GAMES *Micro Value*	1.99
6	•	STAR FIGHT *Alternative*	1.99
7	4	SUPERIOR COLLECTION VOL 3 *Superior*	9.95
8	6	*CODENAME DROID* *Superior*	9.95
9	•	DEAD OR ALIVE *Alternative*	1.99
10	•	LIFE OF REPTON *Superior*	6.95

Compiled by Gallup/Microscope

The the top two positions are held by Alternative this month, ousting Superior and Elite's titles. Alternative also has two new budget entries with Star Fight and Dead or Alive.

FREE MYSTERY GIFT WITH EVERY ORDER!

AMAZING OFFERS

VIEW ROM (Word Processor) ~~£20.95~~ £14.95
VIEW SHEET ROM (Spreadsheet) ~~£20.95~~ £14.95
ACORN PLUS 1 now in stock ~~£50.95~~ £43.95

SCOOP PURCHASE
ELECTRON COMPUTERS IN STOCK NOW
Power Supply included
3 Months Warranty
£59.95

CUMANA DISC DRIVE INTERFACE
Only £64.95

PACKAGE 1
PLUS 1 £49.95
VIEW £14.95
VIEWSHEET £14.95
~~£79.85~~
OFFER PRICE **£65.95**

PACKAGE 2
ELECTRON COMPUTER £59.95
PLUS 1 £49.95
VIEW ROM £14.95
~~£124.85~~
OFFER PRICE **£99.95**

BRAND NEW
SPECTRUM PLUS's 48k
only **£69.95**
* Comes with power supply, User Guide, introductory cass., T.V. aerial and 90 day warranty

ACORN ELECTRON POWER SUPPLY ONLY £9.95

HOME INTEREST BUSINESS

Crazy Tracer	~~£6.99~~	Business Games	~~£6.99~~
Snapper	~~£6.99~~	Desk Diary	~~£6.99~~
Boxer	~~£6.99~~	Graphs & Charts	~~£6.99~~
Planetoid	~~£6.99~~	Theatre Quiz	~~£14.95~~
Turtle Graphics	~~£6.99~~	Watch Your Weight	~~£6.99~~
Chess	~~£6.99~~	The Complete Cocktail Maker	~~£6.99~~

● ANY FIVE FOR ONLY **£7.95**

VOLTMACE TWIN JOYSTICKS

for use with Plus One or BBC
Normally ~~£19.95~~
Now Only £14.95

Big Value Compilations

Beau Jolly Five Star Games II or III
Computer Hits 1,2, or 3
Acornsoft Hits I or II
Superior Collection Vol III
Cass
Usually ~~£9.95~~ **Now Only £7.59**

MICROPOWER GAMES

Felix in the Factory	~~£7.95~~	Stock Car	~~£6.95~~
Croaker	~~£7.95~~	Swoop	~~£7.95~~
Bumble Bee	~~£7.95~~	Jetpower Jack	~~£7.95~~
Gauntlet	~~£7.95~~	Cybertron Mission	~~£7.95~~
Killer Gorilla	~~£7.95~~	Galactic Commander	~~£7.95~~
Rubble Trouble	~~£7.95~~	Moonraider	~~£7.95~~
Electron Invaders	~~£7.95~~	Bandits at 3 O'Clock	~~£6.95~~
Felix Fruit Monsters	~~£7.95~~	Adventure	~~£7.95~~
Chess	~~£7.95~~	Swag	~~£6.95~~
Danger UXB	~~£7.95~~	Escape from Moon Base	~~£7.95~~
Frenzy	~~£7.95~~	Ghouls	~~£7.95~~
Felix meets the Evil Weevils	~~£6.95~~	The Mine	~~£7.95~~
Classic Adventures	~~£7.95~~	Gyroscope	~~£7.95~~

● ANY FIVE FOR ONLY **£7.95**

NEW GAMES

Codename Droid*
Strykers Run
Crazee Rider*
Palace of Magic*
Spitfire
Play It Again Sam*
Spellbinder
Bonecruncher
Cassette ~~£9.95~~ £7.59!
3.5" Disc ~~£14.95~~ £11.59!
*Available on 3.5" disc
The Life of Repton
Cassette ~~£6.95~~ £5.59!
Phone for details of very latest releases!

Micropower Magic Compilations 1 & 2
Only £5.95 each!

Electron Joystick Interface and Software
£14.95

Quickshot II Turbo Joystick
£13.95

Buy Both for only
£25.00!

EDUCATION SPECIALS

Linkword Spanish	~~£14.95~~	Maths 'O' Level II	~~£12.95~~
Linkword Italian	~~£14.95~~	Where?	~~£6.95~~
Talkback	~~£6.95~~	Biology	~~£12.95~~
Workshop	~~£6.95~~	English	~~£12.95~~

BBC & ELECTRON AVAILABLE ANY TWO FOR £3.95

BBC PUBLICATIONS

Maths with a Story I + II (4-8 years)
BBC/ELE Cass ~~11.95~~ 9.95 each!

ASK SOFTWARE (7-11 years)
The best 4 language programs (set)
The best 4 maths programs (set)
BBC/ELE Cass ~~23.45~~ 17.95 per set!

ELECTRON LANGUAGES

Lisp Cassette	~~£9.95~~	£2.95
Turtle Graphics Cassette	~~£9.95~~	£2.95
Forth Cassette	~~£5.95~~	£2.50

Fantastic Offer
Now Available
Brand New
Ferguson 12" Green Screen Monitors
(Model Number MM02)
Only £59.95

Logo cartridge	~~£59.95~~	£29.95
Lisp cartridge	~~£29.95~~	£9.95
Elite	~~£11.95~~	£9.95
Plus 3 Games Disc	~~£10.95~~	£4.95
Superior Collection Vol III (plus 3 disc)	~~£14.95~~	£11.95
Magic Mushrooms	~~£12.95~~	£2.95
Me and My Micro	~~£2.95~~	£1.00
Advanced User Guide	~~£9.95~~	£2.95

Name _____
Address _____
_____
_____
_____
_____
I Claim my Mystery Gift
EU4

SOFTWARE BARGAINS A division of The Micropower Group
Dept EU4, 8.8A Regent Street, Chapel Allerton, Leeds LS7 4PE
Tel: 0532-687735
Ansaphone out of hours

Please make cheques/P.O's payable to Software Bargains & add 95p P&P

SOFTWARE AT BARGAIN PRICES

NEW TITLES THIS MONTH

Play It Again Sam II	£7.50
Skirmish	£7.50
Kourtyard	£7.50
Plan B II	£2.99
Pro Golf	£2.99

TRIPLE DECKERS

3 Games on 1 Cassette for £1.99

1. Grand Prix/Day at the Races/Manic Mole
2. Invasion Force/Haunted/Parachute
3. Lunar Invasion/Lander/Jam Butty
4. Howzat/Fishing/Golf
5. Starfight/Skramble/Karate Warrior
6. Cavern Capers/Snap Dragon/Castle of Sand
7. Atom Smash/Knock Out/Reaction Tester
8. Grebit/Mr. Freeze /Fruit Worm
9. Break Free/Missile Jammer/Code Breaker

ALTERNATIVES AT £1.99

Dead or Alive
Mineshaft
Video Pinball
Microball
Rik the Roadie
Soccer Boss
Olympic Spectacular
Crazee Erbert
Licence to Kill
Confusion
Night Strike

CDS BLUE RIBBON AT £1.99

Bar Billiards
Mango
3D Dotty
Trapper
Return of R2
Video Card Arcade

ACORNSOFT TITLES

Sphinx Adventure	£1.00
Starship Command	£1.00
Hopper	£1.00
Chess	£1.00
Desk Diary	£1.00
Business Games	£1.00
Boxer	£1.00
Me and My Micro	£1.00
Snapper	£1.00
Complete Cocktail Maker	£1.00
Watch Your Weight	£1.00
Linkword Italian	£2.25
Linkword Spanish	£2.25
Turtle Graphics	£2.25
Advanced User Guide	£3.25

IVAN BERG SERIES

English CSE/GCE	£2.00
Biology CSE/GCE	£2.00
Maths 1 CSE/GCE	£2.00
Maths 2 CSE/GCE	£2.00

ROM CARTRIDGES

View (Wordprocessing)	£11.95
Viewsheet	£11.95
Lisp	£7.75
Logo	28.50

ATLANTIS

League Challenge	£2.99
Survivors	£2.99
Panic	£1.99
Cops and Robbers	£1.99
Creepy Cave	£1.99

BUGBYTE
AT £2.75 EACH

Uranians
Hunkydory
Tennis
Savage Pond
Cricket
Starforce
Ice Hockey
Twin Kingdom Valley
Jack Attack
Temptation
Dunjunz
Squeakalizer
Sky Hawk

BUDGET TITLES

Repton 1	£2.49
Death Star	£2.49
World Geography	£2.49
Dog Fight	£2.99
Combat Link	£2.99
Warehouse	£2.99
Suds	£3.99
Peter Scott Trilogy	£2.99
Cascade (50 Games)	£2.99
Daredevil Dennis	£1.99
Snooker (Visions)	£1.99
Tarzan (Martech)	£2.99
Football Manager	£2.99
Last of the free	£3.99
XOR	£4.99
Micro Value (4 games)	£3.99

CURRENT TITLES

Five Star Games Vol 3	£7.50
10 Computer Hits Vol 4	£7.50
Life of Repton	£5.50
Spellbinder	£7.50
Elixir	£7.50
Bone Cruncher	£7.50
Omega Orb	£6.25
Dispatch Rider	£6.95
Ransack	£7.50
Ziggy	£6.95
Impact	£7.50
Graham Gooch Cricket	£7.50
Thunderstruck II	£6.95
Powerpack II (7 Games)	£7.50
Play It again Sam	£7.50
Palace of Magic	£7.50
Codename Droid	£7.50
Crazee Rider	£7.50
Collosus 4 Chess	£7.50
Psycastria	£6.50
Sphere of Destiny	£6.50
Superior Hits Vol 3	£7.50
Elite	£10.50
Around World 40 Screens	£5.50
Repton 3	£7.50
Paper Boy	£7.50
The Lost Crystal	£9.95
The Hunt	£7.50
Village of Lost Souls	£7.50
Spitfire 40	£7.50
Spy v Spy	£7.50
Brian Clough Football	£12.50
Five Star Games Vol 1	£7.50
Five Star Games Vol 2	£7.50
10 Computer Hits Vol 1	£7.50
10 Computer Hits Vol 2	£7.50
10 Computer Hits Vol 3	£7.50
Phantom	£7.50
Evening Star	£7.50
Winter Olypiad '88	£7.50
Star Wars	£7.50

TOWERHILL COMPUTERS LTD

1 Hockcliffe Road
Leighton Buzzard
Telephone: Leighton Buzzard (0525) 385329

ACCESS VISA

ALL PRICES INCLUDE V.A.T. AND P&P. OVERSEAS ORDERS ADD £1.00

PB0 input of the Plus 1's analogue port, normally reserved for things like the fire buttons on joysticks.

This is a digital input, and a one is registered by taking a connection from it to ground. If left floating, a zero is returned.

The main reason for using this input is that the four analogue channels are too valuable to use for simply counting pulses. A pulse can be easily read from Basic or machine code with ADVAL(0) AND 3.

What we need to do, is to arrange a means by which the output of the slotted opto switch can effectively connect PB0 to ground when the beam is interrupted and break the connection when the beam is allowed to reach the sensor by the hole in the disc.

The easiest way to do this is shown in Figure III. An electronic switch, one of four contained in the 4066 chip, is used. A voltage applied to pin 12 will effectively connect pins 10 and 11 together, introducing a resistance of a couple of hundred ohms between them.

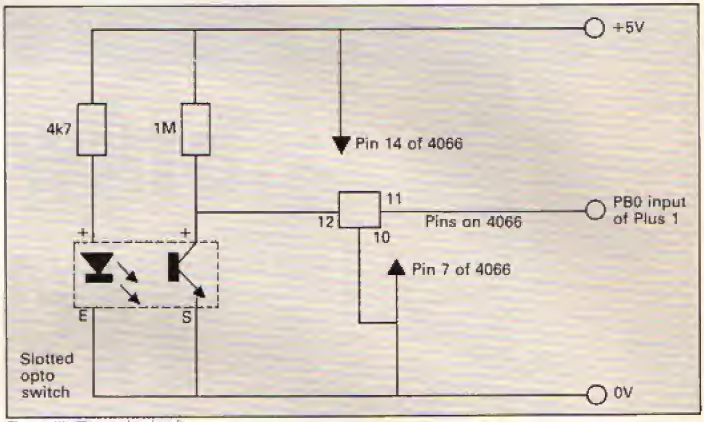
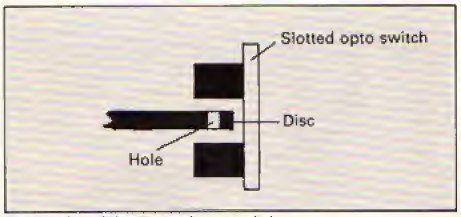


Figure III: The main circuit



The location of the disc and opto switch

Pin 11 is connected to the PB0 input of the Plus 1 analogue port, and pin 10 to the 0V line. The 5V supply needed is also obtained from the Plus 1. The 4700 ohm resistor limits the current to the slotted opto switch.

This is a type H21A1 device, available from Magenta Electronics Ltd., 135 Hunter Street, Burton on Trent, Staffordshire. Similar devices are available, and will work, although the pin-out may be different from that shown in Figure II.

The 1M resistor (one million ohms) is a pull up resistor for the sensor end of the opto switch. When the sensor isn't illuminated – when the hole isn't between the emitter and the sensor – the sensor resistance is very high indeed, and the voltage at the junction of the 1M resistor and the sensor is about 5V.

This turns on the 4066 switch, and PB0 is effectively connected to ground. When the hole is between sensor and emitter, the resistance falls and this pulls down the voltage on pin 12 of the 4066 switch, thus turning it off and disconnecting PB0 from ground.

The 4066 package is fairly widely available, though it may have extra letters, such as BE after the number. Don't worry about this – a 4066BE will still work.

One point to note is that these devices can be damaged by static electricity, so it's a good idea to handle the chip as little as possible and to solder it into the circuit as quickly as possible.

Building the circuit is quite easy – just make sure you get the chip in correctly so that pin 14 is connected to +5V and Pin 7 to ground. Also, carefully check the wiring of the slotted opto switch before turning on power.

If you accidentally short circuit the 4k7 resistor, the LED in the opto switch will almost certainly burn out. Remember to cut the veroboard tracks where there is an x.

To test the circuit, plug it in to the Plus 1 and type in the following line:

```
REPEAT PRINT ADVAL(0) AN
D 3:UNTIL FALSE
```

You should see a column of zeros running up the screen, which change to one each time you interrupt the beam between sensor and emitter say with, a piece of card. Note that some thin paper will let enough light through to give odd results, so take care.

If you don't get this result, check the circuit. If you get all ones no matter what you do, check the wiring to the emitter side of the opto switch.

You can check the 4066 part of the circuit by running a wire from pin 12 and connecting it in turn to +5V – a one should be displayed on the screen – and 0V – a zero should be printed.

As an aside, if you don't connect this wire to 0V or 5V but simply touch it, you may see a mixture of zeros and ones displayed on the screen – here the switch is being turned on and off by mains hum picked up by your body.

All we need to do now is to write a small program to count the pulses. We'll be counting zeros read from ADVAL(0) when the hole on the disc is between the emitter and sensor.

Program I is a very simple Basic listing, which will measure the time needed for the disc to rotate once

Turn to Page 11 ►

ACCESS & VISA HOTLINE
TEL: JACQUI 0625 528885

21st. Software

MAIL ORDER ONLY

PRESENTS A SELECTION OF HARDWARE, UTILITIES & SOFTWARE FOR THE ELECTRON

NEW BEAU JOLLY'S NEW
5 STAR GAMES Vol III
Southern Belle, W. of Exploding Fist, Thunderstruck, Frak, Caveman Capers, Strike Force Harrier & Project Thesius – Only £7.95
COMPUTER HITS IV
Death Star, The Mine, Thrust, Killer Gorilla, Psycastria, Repton, Blagga, Zalaga, Ghouls, Bug Eyes II & Galapolos & Karate Force – Only £7.95

NEW RELEASES

A.S.L.	Cass
Impact	7.95
BLUE RIBBON	
Trapper	1.99
R2	1.99
Mango	1.99
3D Dotty	1.99
Videocard Arcade	1.99
Mirrorsoft Tetris	7.25

TOP TEN	Cass
Warehouse	2.75
GODAX	
Skirmish (joust game)	7.95
Kourlyard	7.95
Larsoft	
Hex	3.65
Superior Software	
Quest	7.95
Play It Again Sam II	7.95

NEW NEW
THIS MONTHS SPECIALS
INCENTIVE'S ADVENTURE CREATOR
ONLY £6.99 (normal price £12.95)
STAIRWAY TO HELL
ONLY £7.95

MICRO POWER'S POWER PACK
3 Cassettes
Crusher, The Mine, Frenzy
All 3 for just £3.95
or £2.50 each title

NEW
P.R.E.S. AP+3
only £110.00

NEW NEW
BUG BYTE'S PLAN B II
Cass £2.99

A & F
Chukie Egg 3.90
Cylon Attack 3.90

ACORNSOFT
Elite 10.95
Forth 8.95
Lisp 4.95
Boxer 1.00
Business Games 2.99
Desk Diary 2.99
Snapper 1.99
View Rom (Cart) 13.95
Viewsheet Rom (Cart) 13.95
Hopper Rom(Cart) 8.95
ISO Pascal Rom (Cart) 54.80

ACORN/LINKWORD
Italian 8.95
Spanish 8.95

ATARISOFT
Robotron 4.95

ATLANTIS SOFTWARE
League Challenge 2.99

BLUE RIBBON
Nightmare Maze 1.99
Castle Assault 1.99
Astro Plumber 1.99
Diamond Mine 1.99
Diamond Mine II 1.99
Darts 1.99
Joey 1.99
Ravage 1.99
Bar Billiards 1.99
Condition Red 1.99

BEAU JOLLY
Computer Hits I 8.45
Computer Hits II 8.45
Computer Hits III 8.45
Five Star Games 8.45
Five Star Games II 8.45

BUG BYTE
Twin Kingdom Valley 2.99
Starforce 7 ..... 2.99
Tennis 2.99
Cricket 2.95
Jack Attac 2.95
Savage Pond 2.95
Skyhawke 2.99
Ice Hockey 2.99
Hunk Dory 2.99
Plan B 2.99
Dumjunz 2.99
Squeakalizer 2.99
Templeton 2.99

COMSOFT
Serpents Lair 3.95
Playbox 3.95
S.A.S. Commando 3.95

C.D.S.
Steve Davis Snooker 7.45
Birdie Barrage 6.95
Colossus Chess IV 8.45
Brian Clough's Fortunes 12.95

DR SOFT
747 Flight Sim. 6.95
Phantom Combat 8.45

DATABASE
Mini Office 4.95
Micro Olympics 4.95
Majic Sword 5.45
French on the Run 8.95

DOMARK
Star Wars 7.95

DURELL MARTECH
Gisburne's Castle 3.95
Tarzan 7.50

ELITE
Paperboy 7.75

EPIC SOFTWARE
The Lost Crystal 10.95
The Wheel of Fortune 7.45
Castle Frankenstein 5.95
The Quest of the Holy Grail 5.95
Kingdom of Klein 5.95

FIREBIRD
Star Drifter 2.95

GILSOFT
The Quill 16.45

GOLEM LTD
Education II 6.50
Fun with Words 6.50
Fun with Numbers 6.50
Jigsaw 6.50

GREMLIN GRAPHICS
Footballer of the Year 7.95

HEWSON
Headtrow A.T.C. 6.95
Evening Star 7.95

ASL SOFTWARE
Bug Eyes II 6.95
Frankenstein 2000 ..... 5.95
Caveman Capers 6.50
Psycastria 6.50
The Last of The Free 6.50
Electron Power Pack 8.65
Thunderstruck 6.75
Thunderstruck II 8.95
Sphere of Destiny 6.75
Omega Orb 6.75
Graham Gooch Test Cricket 7.75
Ziggy 6.75
Electron Power Pack II 7.95
Ransack 7.95
Despatch Rider 7.25

IMAGINE
Mike 7.45

INCENTIVE
Contuzion 5.00
Kat Trilogy 8.45
Adventure Creator 13.25

KOSMOS SOFTWARE
French Mistress A or B 7.95
German Master A or B 7.95
Spanish Tutor A or B 7.95
Italian A or B 7.95
Answer Back Jun. or Sen 8.95
Answer Back Sport 6.95
Identify Europe 6.95

FACTFILE SERIES
(Used with Answer Back Series)
Arithmetic (6-11yrs) 4.25
Spelling (8-12 yrs) 4.25
Natural History (10+) 4.25
English Words (12+) 4.25
First Aid (12+) 4.25
General Science (14+) 4.25
Know England (12+) 4.25
Know Scotland (12+) 4.25
Supersport (14+) 4.25
20th Century History (12+) 4.25
Association Football (14+) 4.25

L.C.L.
Micro French ('O' Level) 21.50
Micro Maths (24 Progs 'O' Level) 21.50
Micro English (24 Progs 'O' Level) 21.50
Mega Maths ('A' Level) 21.50

LARSOFT
Puppet Man 3.65
The Rising of Salandra 4.55
Wychwood 3.65
The Nine Dancers 3.65

LOGOTRON
XOR 7.75

MELBOURNE HOUSE
Way of Exploding Fist 8.95
Dodgy Geezers 7.75

MICROPOWER
Micropower Magic II 6.95
Micropower Magic 9.95
Jet Power Jack 2.95
Positron 2.95
Swag 2.95
Gauntlet 2.95
Chess 2.95
Killer Gorilla 2.95
U.X.B. 2.95
Felix/Evil Weevils 2.95
Felix In Factory 2.95
Felix/Fruit Monsters 2.95
Stock Car 2.95
Rubble Trouble 2.95
Bumble Bee 2.95

MIRRORSOFT
Spitfire 40 ..... 7.95
Harrier Strike Force 7.95
First Steps 7.95
Here/There with Mr Men 6.95
Quick Thinking Plus 5.95

ROBICO SOFTWARE
Rick Hanson 7.75
Project Thesilus 7.75
Myoram 7.75
Enthar 7 (5.25") Disc 16.45
Note the above disc-AP4 I/F only
The Hunt 7.95
Village of Lost Souls 7.95

SOFTWARE INVASION
3D Bomb Alley 2.95
Gunsmoke 2.95
Blitzkreig 2.95
Super Pool 2.95
Vorex 2.95
Chipbuster 5.95

SOFTWARE PROJECTS
Project Graphics 5.95

SQUIRRELSOFT
Supergolf 6.50
Trafalgar 7.00
Cashcare 10.65
VAT Care 13.65
Building Soc. Care 8.95
Investment Care 12.95
T.V. Director 11.65
Squirrels Nuts Pack 7.95

ACORNSOFT AND SUPERIOR SOFTWARE
Smash and Grab 6.95
Overdrive 6.50
Repton 7.95
Death Star 7.95
Repton 2 ..... 7.95
Citadel 7.95
Karate Combat 7.45
Thrust 6.75
Galaforce 7.75
Ravenskull 7.75
Repton 3 ..... 7.75
Acornsoft Hits Vol I 7.75
Acornsoft Hits Vol II 7.75
Superior Hits Vol III Cass. 7.75
Superior Hits III Plus 3D 12.95
Around World 40 Screens 5.95
Strykers Run 7.75
Codename Droid 7.75
Crazy Rider 7.75
Crazy Rider (Disc) 12.75
Palace of Magic 7.75
Palace of Magic (Disc) 12.75
Play It Again Sam 7.75
Elixir 7.95
Spellbinder 7.95
Life of Repton 5.95
Bonacruncher 7.95

TYNESOFT
Winter Olympiad 88 ..... 7.75
Indoor Games 7.95
Boulderdash 7.95
Micro Value Gold 3.99
Spy vs Spy 7.75
Oxbridge 8.75
Phantom 6.75
Microvalue 3.49
The Big K.O 8.75
Futureshock 6.75
Jet Set Willie II 6.75
Goal 6.75
Commonwealth Games 6.50
US Drag Racing 5.95
Jet Set Willy 6.50
Tynesoft Starter Pack I 6.50
Ian Botham Test 6.50
Rig Attack 3.95
Winter Games 6.50
Mousetrap 6.50
Five-A-Side Socca 2.95
Peg Leg 2.95
Bouncing Bombs 2.95
Wet Zone 3.95
Stratobomber 2.95
Caterpillar 2.95
Hyperdrive 2.95
Super Hangman 2.95
3D Maze 2.95
U.K. P.M. 2.95
Invader (L.J.K.) 2.95
Bozo the Brave 2.95
Cylon Attack 2.95
Trek II 2.95
Space Caverns 2.95
Physics 'O' Level 2.95
Chemistry 'O' Level 2.95
Maths 'O' Level 2.95

U.S. GOLD
Crystal Castles 8.65
Rebel Planet (text adv) 6.95
Kayleth 6.95

UTILITIES AND HARDWARE SECTION

ACORN COMPUTERS
Electron Power Supply 12.95

ADVANCED COMPUTER PRODUCTS
A.Quarter Meg Ram 75.95
Advanced Battery Ram 37.99
Advanced Control Panel 32.20

UTILITIES AND HARDWARE SECTION CONTINUED
Advanced Disc Toolkit 32.20
Advanced Electron D.F.S. 22.15
A. R. Manager 13.65
A. Electron D.F.S. Eprs 18.65
Advanced Rom Ad. 13.65
A.S. Ram 27.90
Advanced Disc Inv. 26.55
A.P.4. ..... 75.98
A.P.5. ..... 82.50
Plus 1 ..... 47.95
AMS Mouse 65.95

FIRST BYTE
Quickshot Joystick & I/Face . 27.99
Quickshot II 9.99
Joystick Interface 18.25
BBC/E Printer Cable £9.95

A 1
Super Smooth Power Supply + 2yr guarantee + on/off switch 20.45

P. M. S.
E2P8502 ..... 85.00

SLOGGER
Rombox + ... 51.95
Joystick Interface 18.65
Electron Expansion 2.0 ..... 10.65
Starstore II 27.25
Elkman 9.95
Starrain 9.95
Stargraph 9.95
Starword 18.65
Starword Cumana 18.65
Printer Rom 18.65
16K Sideways Ram 27.95
Trek 9.95
S.E.D.F.S. 22.95
T2P3 or T2CU or T2P4 ..... 22.95
T2SD or T2SEDFS 22.95
Master Ram Board 48.95
Turbo Driver 27.95
Rom Cartridge 11.65
S.E.D.I. (int. + Manual) 70.95

VINE MICROS
Addcomm 26.00

PLUS 3 DISCS

ACORNSOFT'S
Database 18.65

BLUE RIBBON
Games Disc 1 ..... 8.95

C.D.S.
Steve Davis 8.95
Birdie Barrage 8.95

KOSMOS SOFTWARE
French A+B 18.65
German A+B 18.65
Italian A+B 18.65
Spanish A+B 18.65
Ans. Back Sen. 11.65
Ans. Back Jun. 11.65
Ans. Back Sport 11.65
Any Factfile 7.45

SUPERIOR SOFTWARE
Superior Hits III 12.75
Codename Droid 12.75
Crazee Rider 12.75
Palace of Magic 12.75
Play It Again Sam 12.75
Bonacruncher 12.75
Elixir 12.75

BOX OF TEN C20 COMPUTER CASSETTES £4.99 inc VAT & P&P

EDUCATIONAL & GOVERNMENT ORDERS WELCOME
ALL PRICES ARE INCLUSIVE OF VAT AND CARRIAGE
OVERSEAS ORDERS PLEASE ADD £1.00 PER ITEM. INCLUDES INSURANCE

Please send me: Cass ☐ Plus 3 Disc ☐

1. _____ £_____
2. _____ £_____
3. _____ £_____
4. _____ £_____

TOTAL £ _____

Please make cheques payable to:
21st Software Ltd
Access No
☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐
Visa, Mastercard, Eurocard
Card holders name
_____

Send Orders to:
21st SOFTWARE LTD. Dept EU
15 Bridgefield Avenue, Wilmslow SK9 2JS
Tel: Wilmslow (0625) 528885

Name _____
Address _____
_____
_____
Post Code _____
Tel. No (STD) _____

Opto eye on the wind...

JOE PRITCHARD builds another part of his Electron weather station

THIS month we'll see how we can measure wind speed using our Electron weather station. It's carried out using a device called an anenometer.

It consists of four cups arranged at right angles to one another arranged so that when the wind blows the shaft to which they are attached rotates at a speed dependant upon the wind velocity. This rotation is measured using either mechanical or electronic means, and a resulting wind speed in mph or kph can be obtained.

Figure I shows the arrangement we can use to convert the moving wind into a rotation of the shaft. The cups used are from the tops of aerosol cans and are fixed to the cross pieces using epoxy resin or screws.

The cross pieces can be made of strong plastic rod or wooden dowel, but should be fairly light in weight. Take care that the open ends of the cups all point in the same direction.

The cross pieces are then epoxied to the axle (either nylon rod or metal tube), and the disc with the hole in it is epoxied to the lower end of the shaft.

The disc can be made of thin aluminium or thick plastic card, and the hole should be about 6mm in diameter, and 1 or 2mm in from the edge. If you like, a slot can be cut in the edge of the disc rather than a hole. This will work just as well.

The disc is used to estimate wind speed on the Electron – we'll convert its rotation into pulses, then count the pulses generated in a particular time. This will give us a measure of the wind speed in terms of the speed of rotation of the shaft.

A slotted opto switch – shown in Figure II – is used to sense the disc's rotation.

The emitter transmits a beam of infra-red light from a special light emitting diode across to a sensor, which under normal circumstances will detect the beam and show a lower than usual electrical resistance when connected to an ohm meter.

However, if the beam is interrupted in any way the sensor resistance becomes quite high.

If we place the disc between the emitter and the sensor, on each rotation the hole will come between the two, allowing the light to pass and so giving a brief drop in the sensor's resistance. This can be converted into a voltage pulse which can then be detected by the Electron.

The mounting of the anenometer arrangement is left to you, but two things need to be considered.

The first is that the assembly should be free to rotate in the breeze, and the second is that there needs to be room to fit the slotted opto switch so it can see the disc.

In addition, the anenometer cups need to be placed where the wind can catch them, and as far away from buildings as is practicable.

Rather than use an analogue channel to count the pulses, I have used the

Turn to Page 12 ►

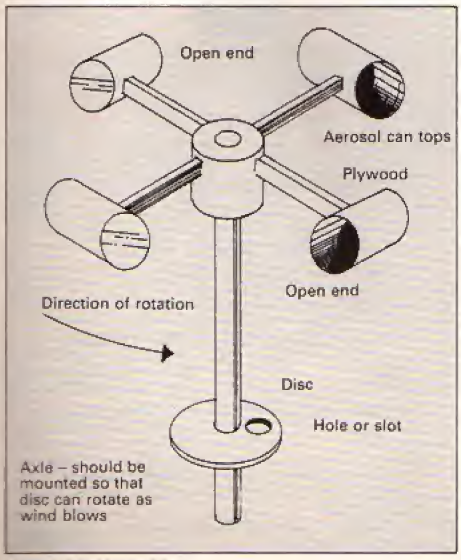


Figure I: The anenometer

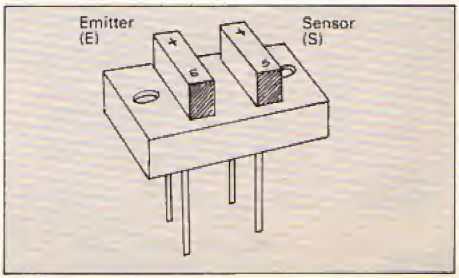


Figure II: The slotted opto switch

Hardware Projects

◀ From Page 12

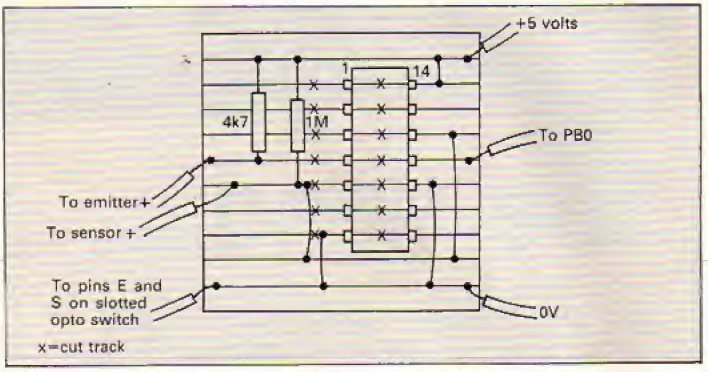
then use this as a measure of the revolutions per second of the disc.

```
  10 REM Pulse Counting
  20 REM By Joe Pritchard
  25 REM (c) Electron User
  30 :
  40 ?&FE=&20289
  50 MODE 6
  60 REPEAT
  70 REPEAT:UNTIL(ADVAL(0)
AND3)=1
  80 TIME=0
  90 REPEAT:UNTIL (ADVAL(0
)AND3)=0
 100 REPEAT:UNTIL(ADVAL(0)
AND3)=1
 110 T=TIME/100
 120 PRINTTAB(6,10)1/T;"
Revs. per Second"
 130 UNTIL FALSE
```

If you run this and spin the disc or otherwise interrupt the light beam between emitter and sensor, then you'll get a changing reading of revolutions per second on the screen.

However, if the disc isn't spinning – as would be the case on a windless day – or is moving very slowly, the Electron will hang up in one of the REPEAT ... UNTIL loops.

To get around this, and to increase the speed of the program, we need to use machine code. In particular, we need to use some interrupt programming to allow us to only check the anenometer for a given length of time, say a few seconds, in order roughly to calculate the speed of rotation.



● *Interrupt programming is quite common in hardware interfacing, so next month we'll look at how we can use the Electron's interrupts to solve this particular problem, and begin work on a simple interface to determine wind direction.*

NEW LOW PRICES!

5.25" BULK PACKED–TOP QUALITY	10	25	50	100	150	250
Single Sided 48T.P.I.	£5.49	£10.50	£18.50	£32.50	£41.50	£61.50
Single Sided 96T.P.I	£5.95	£10.75	£19.00	£33.50	£43.00	£63.00
Double Sided 48T.P.I.	£5.95	£11.00	£19.50	£34.50	£45.00	£66.00
Double Sided 96T.P.I.	£6.95	£11.50	£20.50	£36.00	£46.50	£69.50
Double Sided Coloured 96T.P.I.	£7.95	£13.75	£25.75	£48.50	£67.50	£99.75
Double Sided Reversible 96T.P.I	£7.95	£15.00	£28.50	£53.50	£65.50	£102.50
Coloured & Reversible 48T.P.I.	£6.95	£17.25	£32.75	£63.25	£86.25	£129.75
Coloured & Reversible 96T.P.I.	£9.95	£18.75	£34.50	£65.50	£94.75	£143.75

Packs of 10 5.25" Disks come with Free Plastic Library Case (worth £1.49!)
Coloured Disks come in five colours (Red, Blue, White, Yellow, Green)
Reversible disks have two index holes and two notches!
Coloured and reversible disks come in five colours and have two holes and notches
All Centec disks are packed with a protective jacket (envelope) and come with a full user set, including a label and a write protect tab. The disks are manufactured to top international standards and have a hub ring for added protection. All disks carry our no quibble replacement guarantee and are certified 100% error free

Storage Boxes

3.00" Lockable – Holds 25	£7.49
3.00" Lockable – Holds 60	£8.49
3.50" Lockable – Holds 40	£7.49
3.50" Lockable – Holds 80	£8.49
5.25" Lockable – Holds 50	£7.49
5.25" Lockable – Holds 100	£8.49
5.25" Lockable – Holds 120	£10.95
3.5" Cleaning Disc	£4.99
5.25" Cleaning Disc	£3.99
Disk Notcher	£3.49
Archimedes BBC Printer Cable	£8.49

Printer Stand

This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments i.e. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic reloading.

80 Col	£29.95
132 Col	£34.95

PHILIPS CM8833

* Free Atari Cable
* Free Next Day delivery
* Stereo Audio
* Resolution 500x285

£269.95 Free Cable + Delivery

BRANDED 3.5" COMPUTER DISKS

Sony MF2-DD	£29.95	Sony MF1-DD	£19.95
Goldstar MF2-DD	£24.95	Maxel MF1-DD	£19.95
3M MF2-DD	£29.95	3M MF1-DD	£24.95
Verbatim MF2-HD	£49.95	Verbatim MF2-DD	£29.95
Verbatim MF1-DD	£19.95	JVC MF2-DD	£24.95

VERBATIM OR 3M BRANDED 5.25"–PRICE FOR 20 DISKS

SS DD 48TPI	£24.99	DS DD 48TPI	£28.99
DS DD 96TPI	£35.99	DSHD	£48.99

SPECIAL OFFER BOXES

100 5.25" DS-DD Disks plus 100 Capacity Locking Disk Box	£41.00
75 3.5" DS-DD Disks plus 80 Capacity Locking Disk Box	£89.00
25 Coloured 3.5" DS-DD Disks plus 40 Capacity Locking Disk Box	£44.00

3.5" TOP QUALITY BULK PACKED DISKS

	10	25	50	100	150	200
Single Sided 135T.P.I.	£12.49	£23.95	£46.95	£91.95	£129.95	£169.95
Double Sided 135T.P.I.	£14.49	£26.95	£52.95	£98.95	£145.95	£189.95

Rainbow Pack of five colours – New product!

Single Sided 135T.P.I.	£17.95	£35.95	£62.95	£119.95	£189.95	£219.95
Double Sided 135T.P.I	£19.95	£39.95	£75.95	£145.95	£214.95	£279.95

Packs of 10 3.5" Disks come with Free Plastic Library Case (worth £1.49!)
All discs are supplied with labels and are certified 100% error free

CENTEC DISK SUPPLIES

UNIT 3, THE METRO CENTRE, BRIDGE ROAD, ORPINGTON, KENT BR5 2BE
TEL: (0689) 35353 (6 Lines) (24 Hours) Fax: 0689 77737

Please note we operate a call stacking system. Outside office hours a telephone answering machine will take your order.
Remember – all prices include VAT and delivery! There are no hidden extras to pay! Personal callers welcome: Monday-Friday 9.30am-4.30pm

VISA

Feeling bricked in?

Product: Impact
Price: £9.95
Supplier: ASL, Winchester House, Canning Road, Harrow HA3 7SJ.
Tel: 01-861 1166

IMPACT is a masterpiece of gameplay involving a wall of bricks, a bouncing ball and a bat with which you must keep the ball in play until all of the bricks have been demolished.

Impact is a conversion from the Atari ST, but you'd never know it. Unlike most game conversions, which owe their heritage to some super-micro or other, Impact exhibits none of the tell-tale signs. All too often the programmer commissioned to produce a game conversion bites off more than can be chewed.

Gary Partis has come up with a game which looks and feels as if it was designed specifically for the Electron, and yet has stayed very close to the original.

If the game's theme sounds familiar, you're right. Impact has its origins way back in the old game of Breakout. However, it is as different from Breakout as a Cray III mainframe is from a ZX81. For a start, the stars in the smoothly scrolling starfield move at different speeds. Nothing to do with the gameplay, but indicative of things to come.

The multi-coloured bricks – achieved in Mode 5 by the clever use of stippling – are arranged in quite a devious fashion. On the lower levels you simply demolish them, but as you progress past each screen different types of brick start to appear.

First of all come bricks which need to be hit more than once before they vanish, and later on there are some bricks which are not only indestructable, but invisible as well.

Adding to the fun are various aliens floating around the screen. Although harmless, if the ball touches them it can be badly deflected.

On later levels some aliens drop stun bombs, and if one of these hits your bat it will be paralysed for a second or so – lethal if the action is coming thick and fast at the time.

At the bottom right of the screen is a display panel showing nine different weapons which may be brought into play – the difficulty lies in obtaining them.

Some bricks, when destroyed, release yellow U-shaped tokens which float to the bottom of the screen, flipping end over end as they go. Catching one advances an indicator on the weapons panel, showing you which one you are currently entitled to buy – the more tokens collected, the better the weapon.

Pressing the : key selects the currently indicated weapon, which will remain active until either you are killed or you have completed the screen. Some of the weapons are:

Magnet: Allows you to hold the ball against the bat, letting you move to a better position before releasing it.

Torch: Once selected, this will light up invisible bricks for the remainder of the game.

Laser: Allows rapid fire to quickly destroy bricks.

Missile: Three can be launched, one at a time, after selecting this weapon. They can destroy multi-hit bricks in a single go.

Force field: Selecting this causes the ball to be encircled by an invisible force field which enables it to smash through bricks and aliens without being deflected.

Altogether 80 screens are crammed into this impressive game, and this brings us to the most interesting part of the program – the screen designer. Each time you successfully complete a level, a short password is flashed on the screen which, when entered into the screen designer later on, allows you to edit that particular level to your own liking.

The screen designer is selected from the high-score display. You will be asked to enter the password for that level, after which you are presented with the selected screen, which is now yours to do with as you will.

The Z, X, / and : keys move the editing cursor around the screen, and pressing Return places a brick at the current position. Altogether there are 15 types of brick to select from, and the > and < keys move up or down through the brick types, displaying each one together with its number at the bottom right of the screen.

Here lies my only complaint. No key delay is built into the screen designer – as soon as one is pressed it begins repeating, and it is sometimes quite hard to stop the cursor exactly where you want without overshooting. The same applies to selecting a brick type; more often than not I found myself having to back-pedal.

These are minor points, however, and certainly don't detract from the delight of finally playing some of your own customised screens. You can save all 80 to tape, which means that you can swap your favourite screens with other Impact enthusiasts' creations.

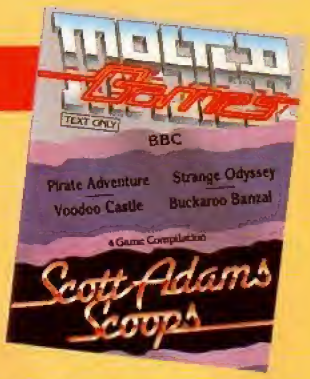
Impact is now one of my all-time favourite Electron games, and it will take a rare program indeed to dislodge it from that position.

Chris Nixon

Sound	8
Graphics	9
Playability	9
Value for money	10
Overall	9

No food for thought

Program: Scoops
Price: £9.99
Supplier: Adventure Soft (UK), PO Box 786, Sutton Coldfield, West Midlands B75 7SL.
Tel: 021-352 0847



THIS is certainly the era of compilations. By their very nature such releases tend to be gambles, and when I first saw this one from Adventure Soft which includes four Scott Adams text adventures, I was a bit sceptical.

Why, on a four adventure compilation, was there the need to include two of Scott's most mediocre offerings, **Voodoo Castle**? and **Pirate Adventure**? Voodoo Castle is a good mystical taster for absolute beginners but that is as far as I would go in recommending it.

Strange Odyssey and the previously unreleased **Buckaroo Banzai** whetted the appetite, but if the object of the exercise had been to release a cross-section of the best of Scott Adams, wouldn't Adventure Soft have been more judicious in including a classic such as Golden Voyage instead of the minute **Pirate Adventure**.

Having played all of Scott Adams' adventures when they were first released, I was anxious to experience Buckaroo Banzai.

The sales hype states, "Only by unravelling the many puzzles set by Scott Adams do you stand any chance of completing this futuristic adventure, set in the world of pop groups and science fiction." I wish I had been given the chance.

The copy I was sent – like many others – was riddled with garbled messages and annoying bugs. The little of the game I was able to play did not convince me of its merits.

It is not, as Adventure Soft acredit, an adventure of moderate difficulty but rather, totally confusing. I understand that unbugged copies are now in circulation – a little late for many, I am afraid.

Strange Odyssey is a superb science fiction jaunt which will involve much head scratching if you are to succeed in your quest on an alien planet. Its parser and text compression are rather limited by today's standards, but this adventure is more than four years old.

Pirate Adventure has nothing, in my opinion, to recommend it. It is supposedly an escapade involving the discovery of fabulous treasure on a strange island. It is, in fact, nothing more than a collection of short brain teasers with only two treasures and 20 odd locations, doing little to tax the old grey stuff.

This is a Pandora's box of a compilation which would be a bargain investment for the beginner to text adventuring, but will hold little of any substance for the more experienced traveller.

Pendragon

Presentation	8
Atmosphere	5
Frustration factor	4
Value for money	8
Overall	6

Space oddity

Program: Starship Quest
Price: £4.95 (£3.00 to Elk Adventure Club Members)
Supplier: The Elk Adventure Club, 2 The Beeches, Tilbury, Essex RM18 8ED.
Tel: 03752 4860

I WAS very impressed by Larry Horsfield's first release last year, Magnetic Moon, and was therefore looking forward with hopeful expectation to this, its sequel.

Starship Quest, is a three-part science fiction adventure which involves a lot of clear thinking and planning if you are to be successful. I spent as much time thinking and scribbling on my map as I did in playing the game.

You begin your quest in the now familiar role of Mike Erlin, second Lieutenant of the United Planets Survey Service spaceship Stellar Queen. Your mission is to explore a huge city which has been discovered on Magnetic Moon's orbital planet. You are keen to discover whether this is the source of Vast Knowledge.

As the scenario unfolds aboard your spacecraft, you must engineer a number of actions quickly and precisely. The beginning is something akin to the start of Enthar Seven or The Hunt, with an important time factor to negotiate if you are to get started in this ingenious teaser.

In fact, part one has some of the most perplexing puzzles I have come across in any text adventure. Even if you are successful, you will soon find out that all the trouble you went to flying a space jeep to the planet Fathnar was in vain. You are somewhere else!

As in Magnetic Moon, it is essential that you use the commands LOOK UP, LOOK DOWN, LOOK ACROSS and LOOK UNDER periodically to ensure that you don't miss any clue or artefact.

In fact, Stellar Queen is an epic in frustration. Once you have conquered a fabulous beast called a Bearion you breathe a sigh of relief, only to discover that your entire inventory has been stolen.

Commands are entirely limited to verb-noun input which at times adds to the frustration, and I long ago groaned at having to type GO DOOR in order to enter a building or machine. You will need to SLEEP and WAIT at different points in part two and indulge in some climbing as the adventure nears its climax.

Larry hasn't quite matched Geoff Larsen's construction of atmosphere with the Quill, but his puzzles are superb. If you scratch your head as much as I did over this brain teaser, you'll end up bald. Beware the Tigerilla, and buy this one.

Pendragon

Presentation	6
Atmosphere	7
Frustration Factor	10
Value for Money	10
Overall	8

Rehashed compilation

Program: 10 Computer Hits 4
Price: £9.95 (cassette)
Supplier: Beau Jolly, 29a, Bell Street, Reigate, Surrey RH2 7AD.
Tel: 0737 222003

HERE is yet another bundle of the best (or supposedly best) games of yesteryear, the fourth in this particular series from compilation specialist Beau Jolly. In spite of the title, however, this offering actually features 12 titles, Galaforce and Karate Combat being thrown in free.

I find that compilations seem to be getting increasingly out of hand. More and more are appearing featuring games that have already appeared on at least one other compilation.

Ten Computer Hits 4 is a case in point: No less than eight of these games have already appeared on compilations – four of them on Beau Jolly's own Five Star Games II.

The package caters well for shoot-'em-up fans, with Zalaga, Psycastria, Deathstar and the afore mentioned Galaforce.

Zalaga was one of the first Electron games to offer a simple diet of pure mindless destruction. Hordes of aliens stream on to the screen before settling menacingly above you.

Without warning they scream down towards you as you move your laser base to intercept.

The game is very hectic because the Zalagans have a nasty habit of curving off the bottom of the screen, then coming up and ramming you from below.

Galaforce takes this basic idea of a straightforward shoot-'em-up several stages further. It features a number of different types of brightly coloured alien, and a much greater variety of attack formations, as well as a great musical accompaniment.

Unlike Zalaga, Galaforce gives you up and down controls, as well as the conventional left, right and fire. Now you can go out and get 'em, rather than waiting helplessly to be overwhelmed.

Both Zalaga and Galaforce allow First Byte and Plus 1 joysticks to be used, as well as having facilities to switch the sound on or off and end the game. However, it isn't long before you start another – just about a couple of seconds, to be precise.

Gary Partis' **Psycastria** must have appeared on almost every compilation since its original release. It is a super smooth sideways scrolling game covering four different scenarios – land, sea, the moon and deep space.

Although the idea is to shoot the 10 energy pods on each level, you quickly learn to survive by simply shooting everything in sight.

Each of the four attack phases must be cleared in one go; if you lose a life, you must start that level again.

This feature – my only gripe with Psycastria – can get infuriating after a while, but the game is well worth a little perseverance.

Deathstar is an excellent conversion of the arcade game Sinistar, in which you are the pilot of a solitary mining spaceship in search of crystals. Shoot the asteroids to release them; once collected they act as bombs.

Competing with you are the worker ships, which use the crystals to assemble, piece by piece, the dreaded Deathstar. The workers are defended by warrior ships that shoot at you at the slightest provocation – remarkably accurately too.

Deathstar's most impressive feature is the 16-way scrolling: As you move, the screen moves with you. A great blast.

In **Thrust** you jet around the galaxy in search of vital power pods. Unfortunately – for once – you are subject to the real physical laws of gravity.

You move around by burning your limited supply of fuel which, can be replenished from fuel tanks dotted around each planet.

The many hostile gun emplacements are problem enough, but your troubles really start when you manage to capture a pod, because then your ship's handling changes dramatically.

To finish a level you must destroy the planet's reactor before blasting off with your prize into the void. Great, but very tricky.

Bug Eyes II is an arcade adventure in which you, as Agent Starman, must collect the 25 keys dotted around and about, in order to release your predecessor, Agent Zelda, from prison.

Such diverse objects as jet-packed lizards, scissors, snakes and worms all bounce around merrily intent on robbing you of your precious oxygen supply.

Unfortunately, the superb music and special effects are let down by a rather weak game.

Repton needs no introduction to anyone. In this, his first adventure, you must collect all the diamonds, while avoiding falling boulders and Repton-eating reptiles.

Some of the diamonds are hidden in safes; needless to say, the key is never easy to find. Playing number one again rather leaves me looking for the transporters, skulls and fungus – but it's as addictive as ever.

In **The Mine** you tunnel through the

Turn to Page 18 ▶

SLOGGER

WHAT PRICE QUALITY?
WHAT PRICE COMPATIBILITY?

To quote a well known phrase, "You only get what you pay for"

This we feel sums up SLOGGERS pricing policy. Our goods may not always be the cheapest, but the products are most certainly the best.

THE PEGASUS 400 DISK DRIVE SYSTEM

Using only top quality components, the system comprises of:

The SLOGGER 40/80 Track double sided 5.25" Disk Drive which maintains

- 400k storage per disk, built in power supply.
- Manufacturers (NEC/TEAC) 1 year guarantee.
- Internal Power Supply unit (built to BS 415).
- Compatibility with the inexpensive (yet most reliable) 5.25" disks.
- Reliability at 3 m/s step rate (four times faster than some drives).

The SLOGGER PEGASUS Disk Interface which boasts

- Excellent Computer Aided Design (CAD) production
- Acorn approved design and standard WD1770 floppy disk controller
- NEW Type-Ahead facility when used with Master RAM Board
- READ/WRITE Shadow Screen when used with Master RAM Board
- 90 page documentation usually provided as a separate purchase
- Compatibility with the ACP ADFS Version 1.1, which offers a total 640k when used with SLOGGERS 5.25" Disk Drive

The SLOGGER SEDFS ROM, about which the Electron User magazine enthused

"I can recommend SEDFS unreservedly"
"Anyone considering upgrading to disk"
"SEDFS is the logical choice"

The quality of SEDFS speaks for itself, unlike other filing systems it offers

- No loss of Electron memory, PAGE=&E00 (not &1D00)

Full Acorn DFS (BBC Model B and MASTER SERIES) compatibility

- All utilities built in, requires no additional menacing utility disk

PEGASUS 400 (Including Interface) .....£149.50 (inc VAT)
PEGASUS INTERFACE (Only).....£74.95 (inc VAT)

MASTER RAM BOARD

Upgrade your Electron to a 64K Machine using 32K of STATIC RAM

- Fits inside the Acorn Electron, uses no cartridge ports.
- Compatible with ALL reliable Electron hardware (except TURBO DRIVER).
- Compatible with ALL Electron software, switching between 64K mode, TURBO mode (yes. . . the TURBO DRIVER IS BUILT IN), and normal mode.
- For correctly written software, HIMEM is ALWAYS AT 8000 in 64K mode so leaving 28000 bytes for BASIC or WORD PROCESSING in ALL screen modes.
- Doubles the speed of Word Processing.
- Upto 300% speed increase for games.
- Additional 12K for use as Printer Buffer with Expansion ROM 2.0.
- Installation Service (See Details below) for those not confident of desoldering the 6502 Microprocessor

NEW FEATURES

- 64K Mode fully compatible with 98% of Level 9 BBC Adventure games.
- NEW OS 2.1 – PLAY ACORNSOFT'S ELITE WITH SLOGGERS JOYSTICK INTERFACE.

"I can thoroughly recommend it"
Electron User 1987

Master RAM Board Kit – code MR2 – Now Only £49.95

INSTALLATION SERVICE

Driver AND RETURN IT WITHIN 7 DAYS OF RECEIPT.

- Includes Postage paid BOTH WAYS (using FREEPOST) and 1 YEARS GUARANTEE.

Order MR1 – Master RAM Board Installed – only £59.95
or TD1 – Elk Turbo Driver Installed – only £39.95

Please note . . . if you own a PLUS 1, please send it with your Electron to be tested to ensure reliability at high speed.

Parcel Post Amount of postage to be paid by licensee

Postage Forward Parcel Service Licence no GJC 1

No postage stamp necessary unless posted in Channel Islands Isle of Man or Republic of Ireland

Date Stamp

P

SLOGGER LTD
107 RICHMOND ROAD
GILLINGHAM
KENT
ME7 1BR

ROMBOX PLUS

SLOGGER's answer to the PLUS 1

Q. Why not buy the Acorn Plus 1?
A. Because "Excellent though the Plus 1 is, I think there is still room for improvement" said the Electron User Magazine.

The ROMBOX PLUS has this improved specification:

1. Four ROM/RAM sockets to free the cartridge slots for more important add-ons. Each socket can take the usual 8K/16K ROMs but can also take 16K RAMS offering a staggering 64K SIDEWAYS RAM
2. The PLUS1 Cartridge slots.
3. The PLUS1 centronics printer port.
4. The Expansion ROM 2.0
5. Switched Joystick interface available.
6. Analogue Joystick interface under development.

Still Only £54.95

64k ACORN ELECTRONS

THESE ELECTRONS ARE FITTED WITH THE MASTER RAMBOARD AND ARE FULLY TESTED AND GUARANTEED WHEN PURCHASED DIRECT FROM SLOGGER

64k ELECTRON
(Switchable)
£99.00

EXPANSION ROM 2.0

for ROMBOX PLUS or PLUS 1

- Supports Printer Buffer with 8K/16K sideways RAM or 12K with MASTER RAM BOARD.
- RSAVE command to save ROM images to tape or disc.
- RLOAD command to load Sideways RAM with a ROM image.
- ROMS command to display ROM/RAM in system.
- JOYSTICK command for the SLOGGER Joystick Interface
- Allows cassette loading in high resolution.
- Supports all standard functions (Printer, ADC, RS423)
- Simply fits into internal ROM socket.

"There is room for improvement in the operating system. No doubt this was the idea behind Expansion 2" *Electron User, July 87*

Only £11.95
(£5 if purchased with 32K SIDEWAYS RAM or JOYSTICK INTERFACE)

TAPE TO DISK ROMS VERSION 2

- Transfer the majority of Tape programs to disk
- Acornsoft, Superior and Micropower no problem
- Compatible with programs copied using Version 1
- More successful than ever before

T2P3 for the Acorn Plus 3
T2CU for the Cumana DFS
T2P4 for AP4 and EOO DFS
T2SD for the Solidisk DFS
T2SEDFS for the SEDFS
T2PEG400 for Pegasus 400

ONLY £24.95

- Upgrade 1-2 only £5 with original ROM

JOYSTICK INTERFACE

for ROMBOX PLUS or ACORN PLUS 1

- Uses inexpensive ATARI-type joysticks
- Compatible with ALL Tape and Disk systems.
- Emulation of keys by Expansion ROM 2.0
- Can be used with well written games either WITH OR WITHOUT A JOYSTICK OPTION

"The ultimate Joystick Interface" *A&B July 87*

"Well worth saving up for, I can recommend it to all Arcade Addicts" *Electron User May 87*

Only £14.95

- Requires Electron Expansion 2.0 Only £5 with this unit

JOYSTICKS

Switched Joysticks for the Slogger Joystick Interface

Quickshot I	£4.00
Quickshot II	£6.00

32K SIDEWAYS RAM CARTRIDGE

for ROMBOX PLUS or PLUS 1

- Ever popular on the BBC
- Best used with EXP ROM 2.0

(1) Save ROM backups for loading into Sideways Ram.
(2) Set up a 16k Print Buffer

- Splits as 2x16k pages VIEW and VIEWSHEET in one slot!!!
- Write protect option . . . prevents corruption of software.

"A very powerful piece of hardware" *Electron User July 87*

ONLY £34.50
(£39.50 with EXP ROM 2.0)

PRESTEL/MICRONET ON THE ELECTRON

Link up to Prestel, Micronet, Telecom Gold and a multitude of very exciting Bulletin Boards using the Slogger Communications Package

Phone for further details (ask for Phil) 0634 52303

COMMS 1
RS423 Interface
Commstar Software
Modem
£85.00

COMMS 2
RS423 Interface
Commstar Software
£59.00

COMMS 3
Modem Only
£30.00

SLOGGER'S AUTHORISED DEALERS

Aberdeen Micro Logic	0569 66233
Birmingham Allen James Computers	021 778 5737
Bristol Avon Computer Exchange	0272 637981
Broxbourne Bradstreet Computers	01 207 4210
Burnley Atomic Computer Systems	0282 54299
Byfleet Calancraft	0932 342137
Cardiff Computer Exchange	0222 493069
Cardigan Cardigan Electronics	0239 614483
Chesham Reeds Photo & Computing	0494 783373
Crawley Computer Centre	0293 37842
Croydon Computer Centre	01 683 2646
Fareham Project Expansions	0329 221109
Farnham Farnham Computers	0252 723107
Glasgow Computer Depot	041 332 3944
Leicester DA Computers	0533 549407
London Compuface	01 580 0181
Market Harborough Harborough Computers	0858 63056
Merseyside Compshop	051 639 3041
Newbury M&S Associates	0635 45774
Oldham Home And Business	061-633 1608
Sheerness Swaletek Systems	0795 665530
Stockport Dram Electronics	061 429 0626
Telford A1 Computer Supplies	0952 502737
Trowbridge West Wilts Micros	02214 62759
Warrington Cheshire Micros	0925 414109
Netherlands Velobyte Computers Rotterdam	010 4138197

Mail Order Only

Stockport 21st Software	0625 529885

All prices include VAT P&P UK Mainland only

SLOGGER EPROM CARTRIDGE

- Carries TWO 8K/16K ROM/EPROM software
- Compatible with PLUS 1, ROMBOX PLUS and BBC Master.
- Simply plugs into cartridge slot

£10.00 for a limited period

ROM SOFTWARE

STARSTORE 2	£29.95
SEDFS upgrade ROM for CUMANA owners	£24.95

* BARGAIN CORNER *

STARWORD	Word Processor	£19.95
STARSTORE	Database	£9.95
STARGRAPH	Graphic Utilities	£9.95
ELKMAN	ROM/RAM Manager	£9.95
STARMON	Machine code Monitor	£9.95
PRINTER ROM	Simplified Printer Control	£9.95
STAR TREK	Machine code dissassembler	£9.95
PDG	Printer Driver	£9.95

SEND FOR THEM TODAY

Cheques payable to SLOGGER LTD

Access No _____ Expiry Date _____
Visa No _____ Expiry Date _____
Name _____
Address _____

PLEASE SUPPLY — Cost

1 _____ £_____
2 _____ £_____
3 _____ £_____
4 _____ £_____
5 _____ £_____

Total £_____

Please send orders to SLOGGER LTD, 107 RICHMOND ROAD, GILLINGHAM, KENT

◀ From Page 17

earth in search of buried treasure. However, The Mine's many other inhabitants are all out to stop you.

You can easily dispose of them with your neutraliser, but time is always against you. This is a fairly average implementation of Dig Dug – fun, but not for very long.

Blagger is a Manic Miner-style platforms and ladders game in which you run and jump around 20 increasingly difficult levels.

As Roger the Dodger, burglar, you must collect all the keys and finally rob the safe before progressing to the next level. Although Blagger is a fun game, it is quite slow and jerky, and compares unfavourably with more recent offerings.

Ghouls is another Miner-type platform game. This time you are in a haunted house and must watch out for the spiders, poisoned spikes and collapsing floors. Although it was very popular in its day, it never grabbed me.

Killer Gorilla is an implementation of the arcade machine game, Donkey Kong, in which you must chase the gorilla of the title up increasing difficult sections of scaffolding in an attempt to rescue the fair maiden from its clutches.

The movement is rather jerky and the sound basic, but it's a game I still go back to on occasions. I think you will too.

Karate Combat is a martial arts game, released as a competitor to Yie-Ar Kung Fu and Way of the Exploding Fist. Although you can play against the computer or a human opponent, the practice mode is very useful, because there are 17 manoeuvres to be mastered.

Thank Buddha for joysticks – both the Plus 1 and First Byte protocols are supported. The graphics are finely detailed, but somewhat on the small side.

Although Karate Combat was well received first time around, it lacks the technical merits of its competitors.

My main reservation about this collection is that so many of the featured titles have appeared on other compilations. If this problem does not affect you, then 10 Computer Hits volume four is definitely not to be missed.

Martin Reed

Sound	8
Graphics	8
Playability	9
Value for money	9
Overall	9

Solve it in your sleep

Program: Dreamtime
Price: £7.50 (5.25in disc only)
Supplier: Heyley Software, 24 Ley Hey Road, Marple, Stockport SK6 6PQ.

A YEAR ago I was given copies of Heyley's first two releases, The Ultimate Prize and Pirate's Peril. Although the adventures had much to commend them as first offerings, they lacked real thought in their puzzle construction, and the programs were slow to respond to commands. They also took about 80 seconds to load from disc.

Dreamtime still takes an eon to load, but after 10 minutes play which then had me hooked for a further four hours, my above listed criticisms were negated. This adventure is fast – despite constant disc-access – well constructed and above all, addictive.

You are presented with an ingeniously designed loading screen which helps take out some of the tedium while waiting for Dreamtime to load. You are also given atmospheric background notes which put you in a role, something akin to a cross between Adrian Mole and Alice in Wonderland.

You awake to discover yourself in the entrance hall of a large hotel. A reconnaissance of your immediate surroundings will present you with direct problems which need to be overcome.

How do you book a room at reception when you have no money? What is the purpose of the salt cellar in the dining room? What do you do about the demon alcohol? These problems must be tackled methodically if your dream is to unfold.

That is mainly what I loved about this adventure. Although the scenario is that of dreamland there is a total lack of the hackneyed fire breathing dragons and magical wizards.

The puzzles are all totally logical in retrospect, if a little far-fetched at times. Furthermore the whole thing can be mapped logically, which makes adventuring more tolerable though no less frustrating.

The atmosphere created is comforting and often humorous but not quite in the league of Robico or Level 9, but this is a fault of the writing utility used rather than that of the design.

This large scale text adventure was composed and written using a modified form of Jonathan Evans' Adventurescape program. As with all adventures which are written using such a utility, design and parser limitations apply. However, Dreamtime succeeds remarkably well and leaves you to wonder what Heyley would be capable of producing if it used pure machine code.

For the more seasoned campaigner, this adventure should keep your drive whirring for many hours and give you a few sleepless nights to boot.

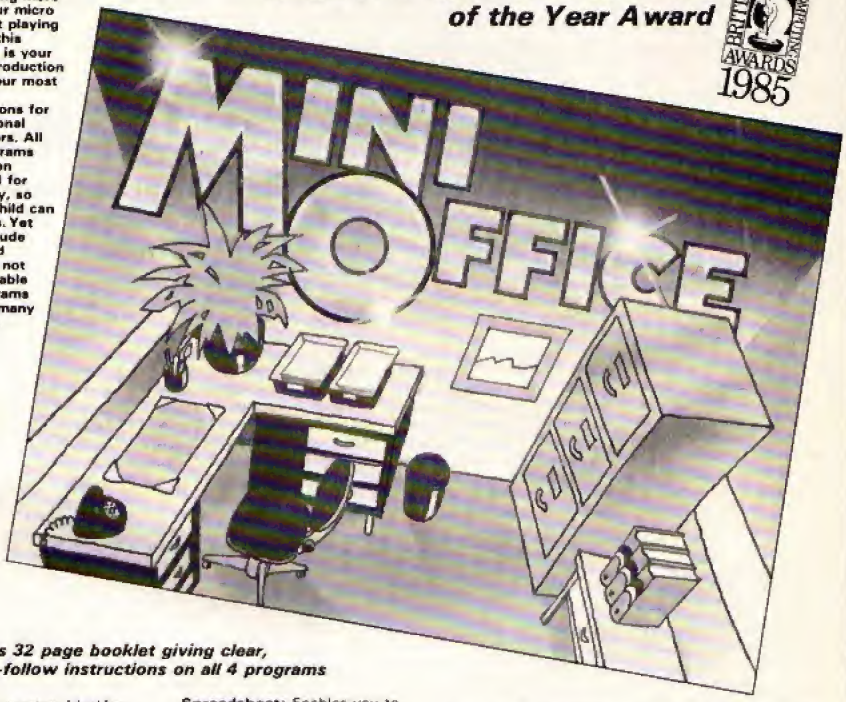
Pendragon

Presentation	6
Atmosphere	7
Frustration factor	9
Value for money	8
Overall	8

If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers. All the programs have been designed for simplicity, so even a child can use them. Yet they include advanced features not yet available on programs costing many times as much!

Finalist for the Home Software of the Year Award

BRITISH MICRO COMPUTING AWARDS 1985



Contains 32 page booklet giving clear, easy-to-follow instructions on all 4 programs

Word Processor: Ideal for writing letters and reports. There is a constant display of both time and word count, plus a words-per-minute display to encourage the budding typist! A unique feature is the double-size text option in both edit and printer mode —perfect for young children and people with poor vision.

Database: You use this for storing information, just like an office filing cabinet. Facts you have entered can be quickly retrieved by just keying in a word or part of a word. They can be sorted, replaced, saved for future use or printed out.

Spreadsheet: Enables you to use your micro for home accounts or pocket money records. It creates a display of numbers in rows and columns. Continuous updating is possible, and a changed figure can be instantly reflected throughout the rest of the spreadsheet. Your results can be saved, to be used for future updates, or can be fed into its associated program .

Graphics: Part of the spreadsheet section, it lets you draw bar charts, pie charts and histograms to give a graphic presentation of your statistics. Helps to give life and colour to the dullest figures!

☆ Word Processor ☆ Spreadsheet
☆ Database ☆ Graphics

Now they're all together - in ONE simple package

Four full-scale programs for an incredible low, low price! **£5.95** cassette

TO ORDER TURN TO THE FORM ON PAGE 53

The gentle art of getting in front and staying behind

In Part 3 of his sprightly sprites series ROLAND WADDILOVE presents some advanced print routines

If you've ever wondered how software companies like Superior Software, Tynesoft, Audigenic and so on, produce such spectacular arcade games, read on.

In this series I'll be revealing some of the secrets of games programming and showing that you don't need to be a genius to write top-selling software.

These articles will provide you with the machine code routines necessary for writing fast, multi-screen, shoot-'em-up arcade classics.

So far I've presented a sprite editor (*Electron User* February 1988), that will enable you to create multicolour Mode 5 sprites and work on up to four frames of animation at once, and some simple print routines to plot the sprites on the screen (March 1988).

Throughout the series I'll be assuming that you know a fair bit of machine code – this is not a beginner's tutorial.

Pete Bibby's new series that started last month is essential reading for novice 6502 programmers, and if you are at all unsure of your machine code capabilities I would advise you to gen up with Pete.

This month I am moving on to advanced sprite printing techniques which will allow characters to move in front of or behind other objects and scenery on the screen without destroying them.

As you'll see, although the sprites move like true hardware sprites on the Commodore 64, Atari 8 bit micros and real arcade machines, a lot of extra processing is involved, which slows down program execution slightly.

It does limit the routines' usefulness as well, but you'll find the techniques employed in some of the latest arcade adventure games.

Before we look at the first program listing I'd like to discuss some of the programming techniques I'll be using.

The listings may look strange, even long winded, but they are written this way for speed.

For instance, you won't find any PHA or PLA instructions in my programs. The stack is commonly used by many programmers to store temporary information, like the contents of the A, X or Y registers.

This is literally a waste of time. The 6502 takes three cycles to execute a PHA instruction and four cycles for PLA, making a total of seven cycles.

The alternative is to store the A register temporarily in zero page with STA &70 and retrieve it afterwards with LDA &70. These two instructions take three cycles each, adding up to a total of six cycles.

This makes the second method one cycle faster, and although this may not sound like much of a saving, if it's in the main loop of a sprite print routine it may save one cycle for each byte of sprite data.

Add this up and it's around 100 cycles for a large character – equivalent to approximately 25 machine code instructions.

Imagine chopping 25 redundant lines of code out of your sprite routine, mul-

```
10 REM Foreground Print
20 REM By R.A.Waddilove
30 REM (c) Electron User
40 *FX16
50 PROCassemble
60 MODE 5
70 FOR i=1 TO 12
80 PRINT"Press a key"
90 NEXT
100 CALL &900
110 END
120
130 DEF PROCassemble
140 add=&70
150 new=&72
160 temp=&74
170 rows=&76
180 temprows=&77
190 coluans=&78
200 counter=&79
210 FOR pass=0 TO 2 STEP 2
220 P%=&900
230 [ OPT pass
240
250 \set up variables
260 LDA #&5010 MOD256
270 STA add
280 LDA #&5010 DIV256
290 STA add+1
300 LDA #30
310 STA counter
320
330 .mainloop
340 \store background
350 LDA add
360 STA new
370 LDA add+1
380 STA new+1
390 LDX #4
400 LDY #24
410 JSR store
420
430 \print sprite
440 LDA #sprite MOD256
450 STA sdata+1
460 LDA #sprite DIV256
470 STA sdata+2
480 LDA add
490 STA new
500 LDA add+1
510 STA new+1
520 LDX #4
530 LDY #24
540 JSR print
550
560 \Wait for keypress
570 JSR &FFE0
580 LDA #4
590 SEI
600 .frame
610 BIT &FE00
620 BEQ frame
630 CLI
640
650 \restore background
660 LDA add
670 STA new
680 LDA add+1
690 STA new+1
700 LDX #4
710 LDY #24
720 JSR restore
730 CLC
740 LDA add
750 ADC #8
760 STA add
770 BCC main1
780 INC add+1
790 .main1
800 DEC counter
810 BNE mainloop
820 RTS
830
840 \new=addr to restore
850 \X=columns, Y=rows
860 .restore
870 STX columns
880 STY rows
890 LDX #0
900 LDY #0
910 LDA new
920 STA temp
930 LDA new+1
940 STA temp+1
950 .loop1
960 LDA rows
970 STA temprows
980 .loop2
990 LDA back,X
1000 STA (new),Y
1010 INX
1020 LDA new
1030 AND #7
1040 CMP #7
1050 BEQ rbottom
1060 INC new
1070 BNE rnext
1080 INC new+1
1090 JMP rnext
1100 .rbottom
1110 LDA new
```

tiply this by the number of sprites on the screen, and you'll see that saving.

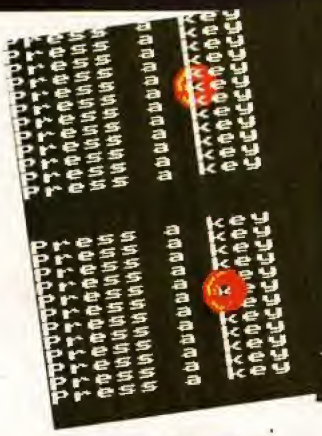
Savings can also be made when adding a small number – less than 256 – to another number (of any size). Suppose you wanted to add 16 to the two-byte address store in *num*, the usual method is:

```
CLC
LDA num
ADC #16
STA num
LDA num+1
ADC #0
STA num+1
```

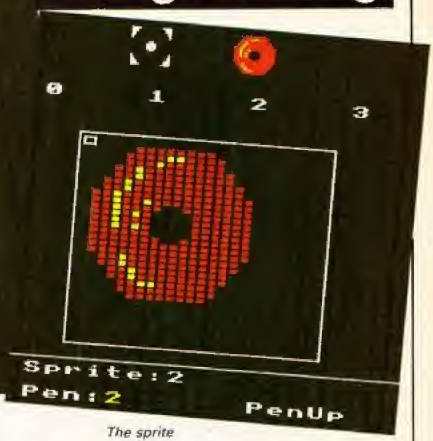
This takes 18 cycles. The alternative is:

```
CLC
LDA num
ADC #16
STA num
BCC here
INC num+1
.here
```

This takes either 17 or 13 cycles, depending on whether the branch is made or not – and it is more likely it won't, hence a saving of five cycles most of the time.



Foreground and background printing



The sprite and its mask

And there's an even greater saving if all you are adding is one to a two-byte number:

```
INC num
BNE here
INC num+1
.here
```

takes just eight cycles most of the time, and 12 at worst – a saving of up to 10 cycles. Again, imagine this saving per byte of sprite data – it's like chopping out 250 redundant instructions that do little more than waste time.

Now it's time to look at this month's Program I. Type it in and save it. It demonstrates how to move a large sprite, shaped like a hoop, smoothly across the screen over the top of some text.

The background text is

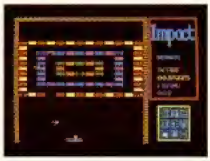
```
1120 ADC #&38
1130 STA new
1140 LDA new+1
1150 ADC #1
1160 STA new+1
1170 .rnext
1180 DEC temprows
1190 BNE loop2
1200 LDA temp
1210 ADC #8
1220 STA new
1230 STA temp
1240 LDA temp+1
1250 ADC #0
1260 STA new+1
1270 STA temp+1
1280 DEC columns
1290 BNE loop1
1300 RTS
1310
1320 \new=addr to store
1330 \X=columns, Y=rows
1340 .store
1350 STX columns
1360 STY rows
1370 LDX #0
1380 LDY #0
1390 LDA new
1400 STA temp
1410 LDA new+1
1420 STA temp+1
1430 .loop1
1440 LDA rows
1450 STA temprows
1460 .loop2
1470 LDA (new),Y
1480 STA back,X
1490 INX
1500 LDA new
1510 AND #7
1520 CMP #7
1530 BEQ sbottom
1540 INC new
1550 BNE snext
1560 INC new+1
1570 JMP snext
1580 .sbottom
1590 LDA new
1600 ADC #&38
1610 STA new
1620 LDA new+1
1630 ADC #1
1640 STA new+1
1650 .snext
1660 DEC temprows
1670 BNE loop2
1680 LDA temp
1690 ADC #8
1700 STA new
1710 STA temp
1720 LDA temp+1
1730 ADC #0
1740 STA new+1
1750 STA temp+1
1760 DEC columns
1770 BNE loop1
1780 RTS
1790
1800 .print
1810 STX columns
1820 STY rows
1830 LDX #0
1840 LDY #0
1850 LDA new
1860 STA temp
1870 LDA new+1
1880 STA temp+1
1890 .loop1
1900 LDA rows
1910 STA temprows
1920 .loop2
1930 .sdata
1940 LDA &3000,X
1950 BEQ skip
1960 STA (new),Y
1970 .skip
1980 INX
1990 LDA new
2000 AND #7
2010 CMP #7
2020 BEQ pbottom
2030 INC new
2040 BNE pnext
2050 INC new+1
2060 JMP pnext
2070 .pbottom
2080 LDA new
2090 ADC #&38
2100 STA new
2110 LDA new+1
2120 ADC #1
2130 STA new+1
2140 .pnext
2150 DEC temprows
2160 BNE loop2
2170 LDA temp
2180 ADC #8
2190 STA new
2200 STA temp
2210 LDA temp+1
2220 ADC #0
2230 STA new+1
2240 STA temp+1
2250 DEC columns
2260 BNE loop1
2270 RTS
2280
2290 .back
2300 EQUS STRING$(4*24,CHR$
(0))
2310
2320 OPT FNdata
2330 ]
2340 NEXT
2350 ENDPROC
2360
2370 DEF FNdata
2380 sprite=P%
2390 RESTORE
2400 FOR i=1 TO 4*24 STEP 4
2410 READ a$
2420 [ OPT pass
2430 EQUD EVAL("&"+a$)
2440 ]
2450 NEXT
2460 =pass
2470
2480 REM Sprite
2490 REM X=4, Y=24
2500 DATA 3010100,2D161603,
2D2D2D2D,F0F0F20,316160F,101
03,872D1E0F,F0F0F87,C840E4B,
F0E0C84,870F0F0F,F0F69B7,F0F
870F,F0F0F0F,303070F,F070303
,F0F0F0F,F0F0F0F,C080800,F0E
0E0C,F0F0F0F,F0F0F0F,C0E0E0F
,8080C
```

Turn to Page 23 ▶

Game of the Month!
A&B Computing
December '87

It plays like a dream... but seems like a NIGHTMARE!

TRAPPED – *in a 1970's arcade machine! Every escape route is blocked by a wall of brightly coloured bricks. Powerfully addictive, with 200k of digitized sound,* **IMPACT** *has 80 built in screens plus 48 that you can design yourself – as hard, as simple, as much fun as you like. Hidden on each screen are special tokens – catch them if you can. Use them to buy one of nine powerful weapons, or keep them until the end of the screen to score a bonus.*



Available now, price £14.95 for Amiga (512k min.) and Atari ST (requires 512k, mouse and colour monitor or TV). BBC/Electron: Tape £9.95, BBC Disk £12.95 (specifications vary).
Audiogenic Software ltd., Winchester House, Canning Road, Wealdstone, Harrow, Middlesex HA3 7SJ.

☎ **Tel: 01-861 1166**

◀ *From Page 21*

not destroyed, not is the sprite image corrupted in any way.

The method used is to reserve a chunk of memory somewhere safe. This is done in line 2300 and is labelled *back*.

Immediately before the sprite is printed the screen information directly underneath is saved to *back*. The sprite data is then poked into the screen memory.

When the sprite is moved the saved screen data is replaced and the sprite printed at the new position – after saving the screen again.

The two almost identical routines, labelled *store* and *restore*, store and restore the screen underneath the sprite. They require the address in *new* and the sprite size in X and Y.

If you watch the sprite carefully as it crosses the text, you'll see that it is inside a black box and you can't see through the hole in the middle. This is because the data is simply poked to the screen.

To reduce this black area to a minimum, any sprite data bytes that are zero are not poked to the screen.

Load Program I and enter these lines to create Program II:

```
  10 REM Background Print
1930 LDA (new),Y
1940 BNE skip
1950 .sdata
1955 LDA &3000,X
```

When you run this demonstration you'll see that the sprite is now printed underneath the text. Tap the spacebar to move it across the screen.

The technique used here is to look at the screen before poking each sprite data byte. If there is nothing there it's OK to poke the data in, otherwise forget it. This ensures that you don't poke sprite data on top of any object already printed on screen.

As before, this method isn't too good. Now there is a black edge round the text as the sprite passes underneath, ruining the sprite shape.

We can solve these problems though, and it involves making a mask. Load Program I again and enter these lines to make Program III:

```
1930 LDA mask,X
1940 AND (new),Y
1950 .sdata
1955 ORA &3000,X
2385 mask=sprite+4*24
2400 FOR i=1 TO 8*24 STEP
4
4000 REM Mask
4010 REM X=4, Y=24
4020 DATA CCEEEEFF,8888CC
,0,0,CC888800,FFEEEECC,0,0
,33331100,113333,0,0,0,0,C
CCC8800,88CCCC,0,0,337777F
F,111133,0,0,33111100,FF77
7733
```

What this program does is to use a mask to decide which bits of the background are allowed to show through. You can see the sprite and its mask on the previous page.

The screen is ANDed with the mask to get the background, then the sprite data is ORed in and the whole lot is placed back in the screen memory.

Run Program III and notice the difference – you can now see the letters through the hole in the middle of the sprite as it passes over the text. The black box around the edge has also disappeared.

Now the task is to move the sprite behind the text in a similar manner.

Unfortunately, because we don't know what is on the screen before we run the program, we can't make a mask and include it as data statements at the end of the listing. In addition to which, the screen is so big you couldn't put it all in data statements.

The only solution is to create a mask from whatever is underneath the sprite.

This is achieved by getting a byte from the screen, swapping the two nybbles, ORing it with the screen byte and EORing the result with &FF.

The sprite data is ANDed in and the whole lot ORed with the screen.

Phew! Quite a lot of processing involved, isn't there? That's why you don't see it used much in Electron games. However, the technique is useful to know. Load Program I and enter the following lines to create Program IV:

```
  10 REM Background Print
 205 work=&7A
1930 LDA (new),Y
1932 STA work
1934 ASL work
1936 ASL work
1938 ASL work
1940 ASL work
1942 LSR A
1944 LSR A
1946 LSR A
1948 LSR A
1950 ORA work
1952 ORA (new),Y
1954 EOR #&FF
1956 .sdata
1958 AND &3000,X
1960 ORA (new),Y
1970 STA (new),Y
```

Run it and notice how much better it is than Program II, our first attempt. The black edges have gone and the sprite is clearly moving behind the text.

We can use the same technique in our foreground print routine and create a mask from the sprite data. It's slightly easier than background printing. The two nybbles of each sprite data byte are swapped, ORed with the data again and EORed with &FF. The background screen data is ANDed with the mask, then the sprite data is ORed in and the whole lot stored in the screen.

To see this in action, loa Program I again and enter the following to create Program V:

```
 205 work=&7A
1941 STA work
1942 STA work+1
1943 ASL work
1944 ASL work
1945 ASL work
1946 ASL work
1947 LSR A
1948 LSR A
1949 LSR A
1950 LSR A
1951 ORA work
1952 ORA work+1
1953 EOR #&FF
1954 AND (new),Y
1955 ORA work+1
```

Again a lot of processing is going on, slowing down program execution slightly. Although Program III is much faster, you need to define and store a mask for every sprite you use. This consumes vast amounts of valuable memory.

If you find yourself short of space use Program V instead and create the mask from the sprite data.

● *There are five programs here to keep you occupied till next month, when we'll move on to look at creating maps. I'll be showing how to store a whole screen in just eight bytes – that's 128 screens in 1k of ram! You don't believe me? Just wait and see . . .*

Special: Arcade game creator

ALL the programs from this series revealing the secrets of writing fast-action arcade games have been put on a special cassette and disc which is available for only £3.95 and £4.95. On it you'll find everything you need to create your own machine code games. The programs include:

- *A Mode 5 sprite editor for designing your own multicoloured characters.*
- *A selection of fast print routines that will move sprites both in front or behind other objects on the screen.*
- *Map generators that will squeeze a Mode 5 screen into eight bytes.*
- *Scrolling maps.*
- *Score print routines*

. . .and much more. This is an offer no aspiring games programmer can afford to miss!

To get this great offer, use the order form on page 53.

DELTA COMPUTERS

BBC MASTER SERIES

Archimedes	Ring for price
Master 128	£395.00
Master Compact Entry System	£349.00
Master Compact Colour System	£555.00

OPUS DISC DRIVES

5802 400K DS DD 40/80T	£104.95
5802DB Dual 800K 40/80T	£204.95
5802D as 5802DB+PSU	£234.95
Opus DDOS (With a drive)	£40.00

SPECIAL OFFERS

Acorn Electron + Acorn Cass player + 3 games + all leads and manual	£79.99
As above + Slogger Rom box + Starword	£119.99
Tatung Std. Res. Col. Monitor	£169.00
Acorn Med. Col. Monitor	£239.00
Philips 8833 Col. Monitor	£259.00
Brother HR5 Printer	£69.99

PRINTER RIBBONS

Brother M1009	£3.25
Canon PC1080A	£3.25
Epson FX,MX,RX 80	£2.70
Epson LX80, LX86	£2.70
Epson FX, MX, RX 100	£3.35
Panasonic KX-P1081	£3.99
Citizen 120D/LSP10	£4.60
Citizen MSP10,20	£2.70
Citizen MSP15,25	£3.25
Kaga 810	£3.25
M Tally MT80	£3.50
Seikosha GP100/250	£2.65
Shinwa CP80	£3.50

PRINTERS (Inc lead)

Epson P-40	£49.95
Citizen 120D	£169.00
Star NL-10	£237.00
Panasonic KX-P1081	£169.00
Amstrad DMP3000	£179.00
Amstrad DMP3160	£199.00

All orders over £100 receive free Touchpad for BBC B (only). Worth £49.95 (while stocks last).
MINIMUM ORDER £10.00

All prices include VAT
Please add £5 carriage on orders over £100
Mail Order only at this address
Trade and Educational enquiries welcome
85 Union Street Oldham Lancs
061-626 3841

VISA

TWO WAYS TO ENSURE YOU GET

A Database Publication

electron user

EVERY MONTH

1. Complete and mail subscription form on Page 53
2. Hand this form to your newsagent.

Please reserve me a copy of Electron User magazine every month until further notice.

☐ I will collect
☐ I would like it delivered to my home.

Name _____

Address _____

_____

_____

Note to newsagent: Electron User should be obtainable from your local wholesaler, or contact Frank Everett, Circulation Manager on 0424 430422

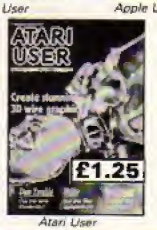
Britain's best-selling computer magazines!

The Micro User

Electron User

Apple User

Atari ST User



Atari User

Amstrad Computer User

Amstrad PCW

Amstrad Professional Computing

Computing with the Amstrad CPC

Computing with the Amstrad PCW

PC Amstrad

On sale NOW at your newsagents or call

Diamond-Europress
0424 430422/422928

Accumulated learning

Make the 6502 dance to your tune in Part 2 of PETE BIBBY's tutorial

DESPITE what you may have heard, there's nothing difficult about assembly language programming. At least there isn't if you take it step by step (or bit by bit).

The trouble is that by the time they turn to machine code most people are fairly competent at programming in languages such as Basic or Pascal.

Being used to producing wonderfully complex programs it seems a bit of a come-down when their first assembler programs are little more than the:

```
10 PRINT "Hello"
```

of their early days with Basic.

Yet that's where they have to start, at the beginning. Which is where we all have to start whenever you begin something new.

But don't be put off, you'll find that your previous programming experience and knowledge of the Electron won't be wasted.

In fact you'll be using it all, with the minor detail that your programs will be in a totally different language – 6502 assembly language.

In this short series we won't have time or space to cover everything. However by the time it's over you should know the basics of assembly language (if that's not a contradiction in terms) and be able to write simple but effective programs.

You'll also be able to approach some of those previously obscure 6502 text books without trepidation and make a good stab at decrypting some of those Roland Waddilove machine code masterpieces.

But that's later. For the moment, let's start with Program I.

```
10 REM Program I
20 MODE 6
30 PRINT CHR$(7)
```

If that causes you any problems, you're probably reading the wrong article. Or I'm writing it. Anyway, it's a plain vanilla Basic program that runs in Mode 6 and gets the Electron to beep by printing the bell character, Ascii seven.

Exciting isn't it? Well maybe not, but that's the program we're going to rewrite in assembler, so expect a bit of noise from now on.

Although it appears quite simple, there's a lot going on in Program I. Think about it. When you type it in, does it work straight away?

No. It just sits in memory, waiting for a RUN command to unleash its beep on the world. And just where does it sit in memory? What does the phrase mean?

As you can see, there's a lot we take for granted about our Basic programs. We know that everything after the REM of the first line will be ignored and that the second line puts the Electron into Mode 6.

But how does this happen? We say that they're Basic instructions, but instructions to who?

And most PRINT statements produce something on the screen, so why doesn't this one? Is it something to do with the seven?

The answers to this last set of questions are:

- Via the operating system.
- To the Basic interpreter and eventually the 6502.
- The PRINT routine does a lot more than just print.
- Yes.

Don't worry if you can't follow all this. It's just there to show that there's a lot more to Basic than might meet the eye. When we run a Basic program all sorts of things are happening, with the operating system and the Basic interpreter beavering away unseen in the background.

We don't have to know these things. They're hidden from us, which is the whole point of high-level languages like Basic.

However, when we come to writing programs in assembly language we have to lift the lid a little and learn a bit more about what's been going on behind the scenes.

The trouble is that there's so much going on it's easy to get confused and give up, thinking that machine code is too complicated for us.

It isn't, though you have to keep your wits about you and stick to doing one thing at a time.

And this is how I intend this series to work. We'll stick to assembly language programming pure and simple (the only kind I know) and only deal with the background details in passing.

Don't worry too much about things that aren't fully explained. After a while they'll either make sense or you'll know enough to track down the answers yourself.

So forget the wood, we're only interested in a few trees.

The first of these is Program II, our very first assembly language program. Well that's not actually true, it's a Basic program which, when you run it, creates a machine code program.

It does this by calling the Electron's assembler to deal with those strange LDAs and JSRs.

The assembler decodes these assembly language instructions and produces a machine code equivalent which sits in memory ready for consumption by the 6502. That comes later.

For the moment just type in the program, save it and do nothing until you've read the next bit.

```
10 REM Program II
20 MODE 6
30 P%=&2000
40 [
50 LDA #7
60 JSR &FFEE
70 RTS
80 ]
```

Let's take the program line by line. The first two should cause no difficulty, they just label the program and ensure that the Electron is in Mode 6.

Line 30 sets an integer variable *P%* giving it the hexadecimal value &2000 (8192 decimal). We'll come to why we do that later. Moving on to the next line we see that it contains a solitary square bracket.

It's this bracket that tells the Electron that whatever is coming next isn't good old Basic, it's assembly language mnemonics.

Obligingly, the Electron invokes a subroutine (called, unsurprisingly, the assembler) to deal with these,

Turn to Page 26 ►

◀ From Page 25

translating them from abbreviations we can understand into machine code which the 6502 can use.

The first of these mnemonics is LDA which stand for LoaD the Accumulator. The accumulator is a register inside the 6502, a kind of electronic scratchpad that the chip uses in its sums.

We'll be seeing a lot of the accumulator, but for the moment just look on it as a special area inside the CPU which can hold numbers between 0 and 255. In other words it's one byte wide.

Now we know that LDA means load the accumulator, the next question is, what with? The answer is with the seven, the number that comes immediately after the LDA. Ignore the hash sign for the moment.

The assembler program takes the complete mnemonic and puts it in memory as a pair of op(eration) codes.

The next mnemonic it comes across is at line 60. Here JSR means Jump to SubRoutine. The assembler duly translates this to a numeric code which will cause the 6502 to do just this.

But which subroutine? The answer lies after the JSR in the form of &FFEE, the address of the required routine.

Now this is a machine code routine that's part of the Electron's operating system. It's roughly equivalent to Basic's PRINT (or more precisely, VDU).

We'll come across it again – for the moment all you need to know is that when that routine is called, it looks at the value in the accumulator and if it's seven, it gets the micro to beep.

Just like a Basic subroutine, this does its job and then the program carries on from the instruction after the JSR.

In this case it's the last of our mnemonics, RTS – ReTurn from Subroutine.

The assembler translates this into an opcode which, when it's fed into the CPU, tells it that's the last of the machine code in this routine and it might as well hand things back to Basic and the operating system.

The final line of the program just contains the matching square bracket. This closes the assembler program, saying that there are no more mnemonics. In this case it's also the end of the program, there being no more Basic lines to process.

Having endured all the above, make sure that you've saved the program and then RUN it. I'm afraid you won't get the promised beep. Instead you just get:

```
2000
2000 A9 07      LDA #7
2002 20 EE FF   JSR &FFEE
2005 60         RTS
```

Don't worry, things haven't gone wrong. What you've got there is an assembler listing. Which is as it should be.

All Program II does is to call the assembler, take the mnemonics that it finds there and translate them into codes that the 6502 can understand.

It puts these into memory locations starting at &2000 (remember P% in line 30?), one after another as you might be able to deduce from the assembly listing.

However that's all the program does. It doesn't execute the machine code it produces, it just sticks it in memory.

And, unless you've switched off or otherwise messed around, that's where it should still be. Now we know that RUN gets Basic programs started, so what gets machine code routines going? The answer is the keyword CALL. This is a Basic keyword which sends the micro off to perform the machine code routine at the address specified just after the CALL.

So if you enter:

```
CALL &2000
```

and press Return, your willing Electron will look at memory location &2000 and, starting from there, perform the routine.

Running Program II should have had the assembler put the appropriate opcodes into successive locations, with the result that we hear our beep.

Make sure that you distinguish between the two processes. In effect, to get our beep we've had to run two programs.

The first – Program II – takes assembly language mnemonics and translates them into a machine code program, storing it in memory.

It produces the code but it doesn't execute it. In other words, the assembler assembles the code, but that's as far as it goes.

To actually get the machine code to do its tricks, we have to invoke it with a CALL statement – hence running our second program. Otherwise it just lurks broodingly in memory waiting for a call that never comes.

Program III is just Program II with the CALL added as a last line. Now when you RUN the program not only is the code assembled into memory starting at location &2000, the CALL ensures that it's executed as soon as the program leaves the assembler. And as the code is executed we get our beep.

```
10 REM Program III
20 MODE 6
30 P%=&2000
40 [
50 LDA #7
60 JSR &FFEE
70 RTS
80 ]
90 CALL &2000
```

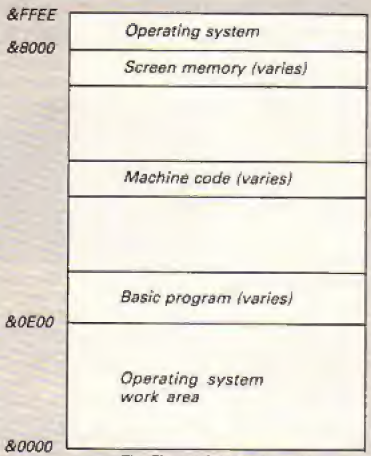
● *On that note I'll leave you until next month, when we'll be looking further into the world of accumulators, assemblers and addressing.*

One way of representing memory is as a memory map. For the Electron this comprises a rectangle which has location &0000 at the bottom and runs to &FFFF at the top.

Everything your Electron does is controlled from inside this memory map. The operating system is contained in areas of memory at the top and bottom.

Between these are sandwiched Basic programs, any machine code routines you write and the memory used to manage the screen.

While you needn't be too aware of it in Basic programming, the Electron's memory map is required knowledge as you go deeper into assembly language programming.



The Electron's memory map

Electron Memory Map

Part 1

THIS is the first part in a new series of fact sheets providing a complete description of the Electron's memory map. The whole 64k – 32k of ram and 32k of rom – will be fully documented to enable you to make more efficient use of memory in your Basic and machine code programs.

We kick off the series right at the bottom of memory, starting at &00. The first half of zero page is allocated to the currently selected language – normally Basic – while the second half is used by the operating system.

TABLE 1

Address	Use
&00/&01	LOMEM.
&02/&04	Heap pointer – top of variable stack.
&04/&05	Basic stack pointer.
&06/&07	HIMEM.
&08/&09	ERL.
&0A	PTRA offset – index into current statement.
&0B/&0C	PTRA base – pointer to start of current statement.
&0D-&11	Pseudo random number for RND.
&12/&13	TOP.
&14	Size of print field.
&15	Hex print flag.
&16/&17	ON ERROR pointer.
&18	High byte of PAGE – low byte assumed to be zero.
&19/&1A	PTRB base – start of current expression.
&1B	PTRB offset – index into current expression.
&1C/&1D	Pointer to next DATA item.
&1E	COUNT value.
&1F	LISTO option: Bit 0 – space after line number. Bit 1 – indent FORs. Bit 2 – indent REPEATs.
&20	TRACE flag.
&21/&22	Maximum TRACE line number.
&23	WIDTH.
&24	REPEAT/UNTIL loop depth counter
&25	GOSUB depth counter.
&26	FOR/NEXT loop depth counter.
&28	OPT assembler value: Bit 0 – produce listing Bit 1 – give errors. Bit 2 – relocate.
&2A-&2D	IntA – workspace for integer calculations.
&2E-&35	FPA – workspace for floating point calculations.
&36	StrA – length of string at &600.
&3B-&42	FPB – workspace for floating point calculations.
&4F-&8F	Not used.

Turn to Page 28 ►

◀ From Page 27

TABLE 2

Address	Use
&90-&9F	Econet – not available on the Electron so won't be used.
&A0-&A7	NMI workspace – used by disc systems, free if cassette only.
&A8-&AF	Used by star commands, free if none used.
&B0-&BF	Filing system workspace.
&C0-&CF	Used by currently active filing system.
&D0	VDU status byte: Bit 0 – Printer output status. Bit 1 – Scrolling disabled. Bit 2 – Paged mode selected. Bit 3 – Software scroll. Bit 4 – Not used. Bit 5 – VDU 5 enabled. Bit 6 – Cursor split status. Bit 7 – VDU disable status.
&D1	Mask for the current graphics point.
&D2/&D3	Text colour bytes to be ORed and EORed into memory.
&D4/&D5	Graphics colour bytes to be ORed and EORed into memory.
&D6/&D7	Address of the current graphics character cell.
&D8/&D9	Address of the current text character cell.
&DA-&DF	Temporary workspace.
&E0/&E1	Unused.
&E2	Cassette filing system status byte: Bit 0 – Input file open. Bit 1 – Output file open. Bit 2 – Not used. Bit 3 – Set if cataloguing. Bit 4 – Not used. Bit 5 – Not used. Bit 6 – At end of file? Bit 8 – End of file warning given?
&E3	Cassette *OPT options in low nybble.
&E4-&E6	Operating system workspace.
&E7	Auto repeat countdown timer.
&E8/&E9	Address of input buffer – used by osword 0.
&EA	RS423 timeout counter, free if no RS423.
&EB	Used by cassette system.
&EC	Internal key number of last key pressed.
&ED	Internal key number of first key if more than one pressed.
&EE	Internal key number of key to be ignored.
&EF	Copy of A register of last osbyte or osword.
&F0	Copy of X register of last osbyte or osword.
&F1	Copy of Y register of last osbyte or osword.
&F2/&F3	Text pointer to star commands and filenames.
&F4	Number of the currently selected rom.
&F5-&F9	Not used.
&FA/&FB	Operating system workspace.
&FC	Copy of A register at last interrupt.
&FD/&FD	Points to byte after last BRK or language version string.
&FF	Escape flag.

electron user MAIL ORDER OFFERS electron user MAIL ORDER OFFERS

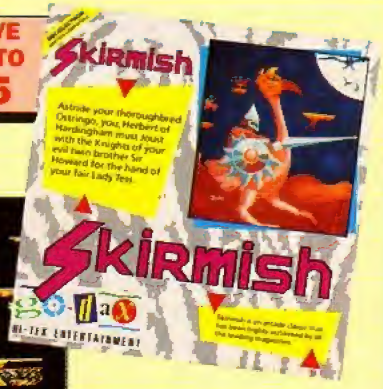
Get yourself in a flap with Skirmish!

SAVE UP TO £5

Sit astride a giant blue ostrich and engage in exciting futuristic jousting contests against opponewnts riding giant green buzzards.

This superb one-or-two-player game features beautifully animated sprites, with a plabability that's second to none.

"I can recommend Skirmish wholeheartedly. It is one of the most playable games I have ever seen and will certainly lead to a severe case of repeated late nights . . . Playability: 11 out of 10"
– Hac-Man, The Micro User, March 1988



Suitable for	Product	Format	RRP	Special reader offer	YOU SAVE	Offer including subscription	YOU SAVE
Electron	Skirmish	Tape	£9.95	£7.95	£2	£19.95	£5

TO ORDER PLEASE USE THE FORM ON PAGE 53

Setting a record

MIKE PLUMMER ends his Pascal series with a look at data types

IN this, the final part of our examination of Acornsoft's Pascal cartridge, we'll look in more detail at some of the types of data available to the Pascal programmer, plus a few other details.

I will not touch on some aspects of the language, since these articles are only meant to be an introduction, but you can find out about them in the hefty manuals provided. Two examples are dynamic variables and pointers.

One of the big advantages of Pascal – and other modern computer languages – is the wealth of data structures available, and also the ability to create structures of your own.

If you typed in last month's programs you may have been puzzled by a statement which said:

```
WHILE (buf[ptr] IN
       [CHR(9),' '] ...
```

This introduces a new type called SET. IN is a set operator, and the list contained within the square brackets is a constant set. You can also have set variables as in Program I.

In this case, the SET variable *caps* contains all upper case letters. The ".." signifies that all values between and including A and Z are in the SET.

The ORD function converts the CHAR *ch* to an integer in order to add the offset of 32 to convert it to a lower case letter, and the CHR converts the answer back to type CHAR.

The maximum number of items in a set is determined by the micro Pascal is being used on.

Another new type of data we can look at is the so called enumerated type. This a very fancy way of describing a simple idea. Look at the following bit of code:

```
TYPE
 days=(mon,tues,wed,thurs,
       fri,sat,sun);
VAR
  today : days;
.
.
.
IF today=sun THEN
  WRITELN('Stay in bed!');
```

Each item in the list represents a value the variable *days* can take. You can't print the actual value of *today*, only its ordinal value, that is, the position of its value in the list. You can extract this using the ORD function – *mon* has the ordinal value zero, *tues* is one and so on.

This data type is very useful, because if you select your variable types properly it is impossible to assign a value of *september* to a variable of TYPE *days*.

There is no need to use these types, but it does make your code much easier to read and understand.

The next type of data I want look at is the type FILE. We have already seen the special FILE type TEXT in last month's examples, but in general a FILE type contains data of a particular type. For instance, a file which is to contain real numbers is declared as:

```
TYPE
  rfile=FILE OF REAL;
VAR
  datafile : rfile;
```

The variable *datafile* must also be declared in the PROGRAM statement. You can probably deduce that the TEXT type is equivalent to FILE OF CHAR.

Program II is a short example using FILE types. This is absolutely standard Pascal, and there are no actual filenames in the RESET and REWRITE calls.

Pascal either uses the operating system or defaults to generate filenames. In our case, names are generated as pas_0, pas_1 and so on.

In order to use named files, the extended versions of RESET and REWRITE should be used, including a filename as a second parameter, for instance:

```
RESET(money,'BALANCE')
```

Now we come to the most important new data type of all, the RECORD.

This is a new concept to Basic programmers, and it allows you to make up your own data structures.

Consider how you would normally store your list of girlfriends (or boyfriends if you are a lady programmer). You would store their names, addresses and phone numbers.

In a Basic program you would store them in a series of arrays such as *name$*(50), *house$*(50), *phone%*(50), and relate them to each other using the same indexing variable such as *name$(current%), phone%(current%)* and so on.

This is all very well, but

```
PROGRAM setdemo(input,output);

(* Convert input to lower case *)

VAR
 caps : SET OF CHAR;
 ch   : CHAR;

BEGIN
 caps:=['A'..'Z'];
 WHILE NOT eoln DO
 BEGIN
  read(ch);
  IF ch IN caps THEN ch:=CHR(ORD(ch)+32);
  WRITE(ch)
 END;
 WRITELN
END.
```

Program I

> **"One of the big advantages of Pascal is the wealth of data structures available."**

◀ *From Page 29*

what if, for reasons best known to yourself, you changed your affections to a different girl?

To change the values of the variables *current_girl$*, *current_address$* and *current_phone%* is rather tedious. It would be nice if you could tie all of this related data together. Well, in Pascal, you can.

Consider this bit of code:

```
TYPE
 string = PACKED ARRAY
          [1..10] OF CHAR;
 girlfriend = RECORD
 name    : string;
 address : string;
 phone   : INTEGER;
END;
VAR
 harem   : ARRAY [1..10]
           OF girlfriend;
 current_girl: girlfriend;
  number : INTEGER;
.
.
.
current_girl:=
           harem[number];
.
.
.
```

We have seen the TYPE string before, but a RECORD is new. A record consists of a collection of related variables' TYPEs referred to as fields, and these are terminated by an END. The array *harem* and variable *current_girl* are both of TYPE *girlfriend*, and can be equated. This is fine, but how can you refer to an individual field in a RECORD?

It is very easy. For instance, to refer to the *phone* field in the RECORD *current_girl* you use:

```
phone_number:=
      current_girl.phone;
```

The variable *phone_number* must be of the same type as the field *phone*, that is, integer. Similarly, to set the value of a RECORD field, you use:

```
harem[number].phone:=
            phone_number;
```

If you make a lot of references to a record in the same same bit of code, you can use the WITH statement, as in Program III.

This also introduces the CASE statement, which is better for selecting an action depending on the value of a variable than a large number of IF ... THEN ... ELSE statements.

Each possible value of the variable will cause only one statement to be executed. If you want more than one thing to be done, you must use a compound statement surrounded by BEGIN and END like:

```
case 100:
 BEGIN
 triples:=triples+1;
 WRITELN('One hundred
    and eighteeeeee');
 END;
```

You can do many more powerful things with RECORDS and some other data types which I haven't got space to mention here.

This series of articles has done no more than scratch the surface of Pascal, which is, for all its many faults, an extremely useful and powerful language.

There are many features, even more powerful than the ones I have described here, and I cannot recommend strongly enough that you buy a cartridge right away if you have not got one.

A very cut down version called S-Pascal is also available on cassette for a much lower price, and it produces machine code rather than the interpreted runtime code of ISO-Pascal.

I hope I have persuaded some of you Basic programmers to have a go at Pascal. I am sure you won't regret it.

```
PROGRAM numbers(input,output,numfile);

TYPE
 nfile   = FILE OF INTEGER;
VAR
 numfile : nfile;
 num     : INTEGER;
BEGIN
 REWRITE(numfile);
 num:=0;
 WHILE num<>-1 DO
 BEGIN
  WRITE(':- ');
  READLN(num);
  WRITE(numfile, num)
 END;
 RESET(numfile);
 WHILE NOT EOF(numfile) DO
 BEGIN
  READ(numfile,num);
  WRITELN('Number is ',num)
 END
END.
```

Program II

```
PROGRAM elecuser(input,output);
(* Demonstration of RECORDs *)

TYPE
 critique=(interesting,merely_brilliant,outstanding);
 issue   = RECORD
 comment : critique;
 number  : INTEGER;
 END;

VAR
 EU      : issue;
PROCEDURE getrecord(VAR local_issue : issue );
VAR
 lch     : char;
BEGIN
 WITH local_issue DO
 BEGIN
  WRITE('Electron User issue number : ');
  READLN(number);
  lch:=' ';
  WRITELN('Was it (I)nteresting,');
  WRITELN('        (M)erely brilliant,');
  WRITE ('    or (O)utstanding? ');
  WHILE NOT (lch IN ['I','M','O']) DO
  BEGIN
   READLN(lch);
   IF lch IN ['a'..'z'] THEN lch:=CHR(ORD(lch)-32)
  END;
  CASE lch OF
   'I': comment:=interesting;
   'M': comment:=merely_brilliant;
   'O': comment:=outstanding;
  END
 END
END;

BEGIN
 getrecord(EU);
 WRITELN('Electon User No. ',EU.number);
 WRITE('is ');
 CASE EU.comment OF
  interesting:     WRITELN('interesting');
  merely_brilliant:WRITELN('merely brilliant');
  outstanding:     WRITELN('outstanding');
 END
END.
```

Program III

ICARUS

£9.95 cassette
BBC Model B, B+, Master and Electron

£11.95 disc
BBC series; 5¼" or 3½"

Split-screen action with different views for each player. When you are both in the same area the views are the same.

Crack the code to the forcefield, pass through the portals to raid the area of valuable credits, then head for the lift.

Now *TWO* can play – and experience . . .

THE CHALLENGE OF A LIFETIME!

Starship Icarus is plummeting towards the sun, and the only hope of averting the impending cataclysm is for you to teleport on board, disable the master computer and regain control . . .

This spectacular fast-action game has a unique split-screen which means that one player can complete the game on his own – or play simultaneously with a friend – to fight the trigger-happy droids which infest the ship. With 20 levels of nerve-racking excitement, forcefields, mines, electronic doors, emergency lifts, movable walls, and opportunities to build up your armour, blaster and health ratings, this is one game you won't complete in a few weeks!

There can be no doubt that Icarus, with its incredible one- or two-player action, is one of the most exciting games ever created for the BBC Micro and Electron.

Check it out for yourself – and take up the challenge!

Icarus is the result of six months' intensive work by Powerhouse Software, the programming team which developed the top-selling Durrjunz. A full three months has been spent play-testing and fine-tuning to produce an addictive challenge with a gameplay that's really out of this world!

Available from all good stockists or order direct by sending a cheque or postal order made payable to Mandarin, together with your name and address. Access or Visa owners: Phone our hotline or send your card number with your order. Price include P&P.

MANDARIN SOFTWARE

Europa House, Adlington Park,
Adlington, Macclesfield SK10 4NP.

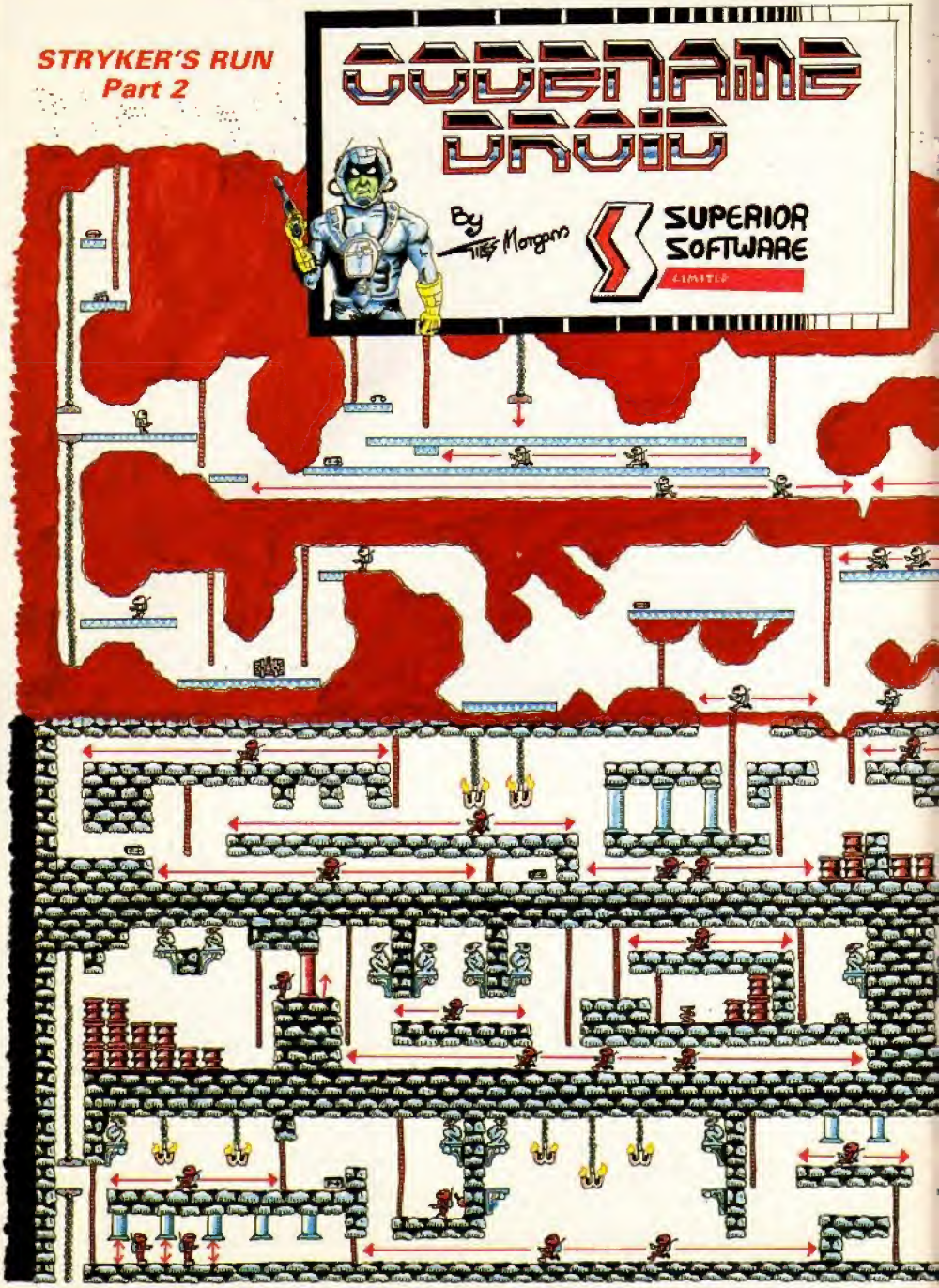
TELEPHONE ORDERS: 0625 879920 ENQUIRIES: 0625 879940

STRYKER'S RUN
Part 2

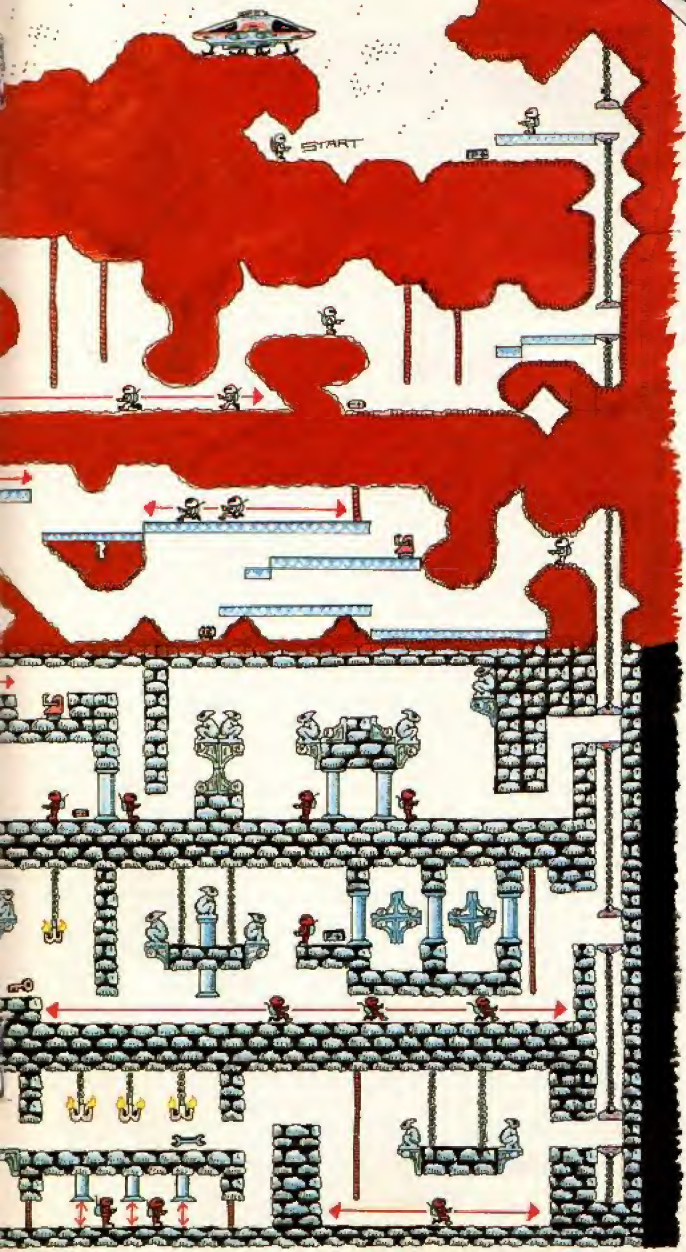
CODENAME DROID

By Tiff Morgan

SUPERIOR SOFTWARE LIMITED



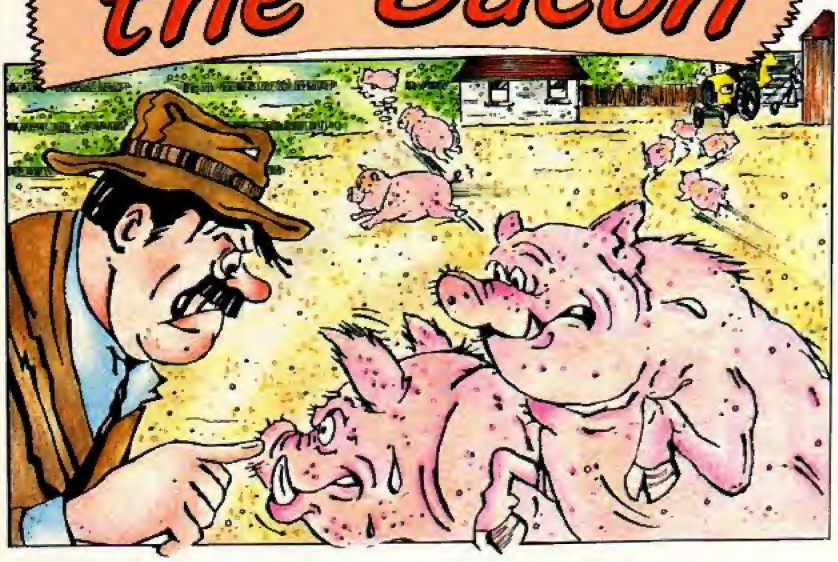
The map



KEY

- Energy cell
- Passcard
- Micro film
- Plutonium rods
- Mystery package
- Jet-pack
- Rom, navigation
- Key
- Spring
- Spanner
- Remote activator
- Control button
- Computer disc
- 'Herbert' droid
- Fuel for jet-pack

Bring home the Bacon



Beat your rival and be the first to re-house your pigs in this great game from BILL VINCENT

IN this board game for one or two players, you are a swineherd – bent on driving your four pedigree pigs from their sty one by one, to lead them from grassy tussock to tussock to their new quarters in the middle of a field.

However, a rival swineherd is also trying to do the same with his pigs, and inevitably your paths coincide.

You move by throwing a dice, and you must throw a six to get each pig out of its sty. If you have started more than one pig on its way, the computer will ask which one you wish to move.

Just press the number of the pig you want to galvanise into activity – the arrows displayed in your colour show which way you will go.

You can't move a pig to a tussock occupied by another of your own pigs but you can land on one of your rival's, sending it back to its sty. And of course, he can do the same to you!

Some tussocks are slippery, and if you finish on one and the way is clear, you will keep moving – as shown by the chevrons and black arrows.

Bogs are a different matter. They are black, and you can land on one whether it is occupied or not – but your pig will disappear into the glooch, to reappear in any bog not already occupied by one of your pigs.

If one of your rival's pigs is already there it will be sent back to its starting point.

You must throw the exact number to finally move a pig to its new quarters in the centre of the screen. The winner is the swineherd who gets all four pigs there first.

One player can compete against the computer or two can play against each other. You can also choose your preferred colours for the background, and for each herd of pigs.

The default colours are probably the best for a black and white TV or monitor.

Although the rules sound quite complicated, the game is really quite straightforward and you'll soon pick it up – try it and see.

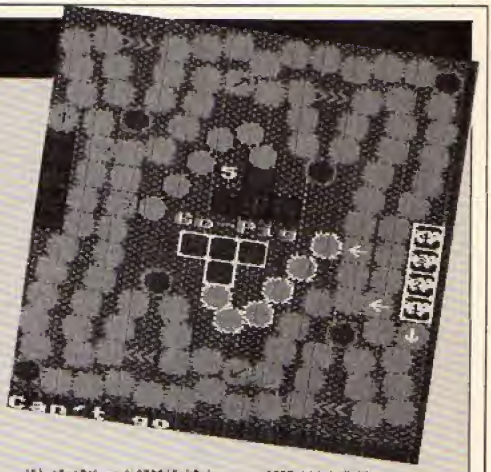
CONTROLS

Q,S	Turn sound off or on
Space	Throw dice
1,2,3,4	Which pig to move
DELETE	Quit game

PROCEDURES

game	Main control section
dice	Throw the dice
choose	Prompt player to choose a pig
compchoose	Choose the best computer move
text(t$)	Scroll messages on to the screen
key(k$,t$)	Wait for a key

Go-Pig listing




```
  10 REM Go-Pig
  20 REM By W.Vincent
  30 REM
  40 MODE6
  50 PROCinstruct
  60 PROCinit
  70 MODE5
  80 PROCscreen
  90 ONERRORGOTO3670
 100 :
 110 REPEAT
 120 PROCreset
 130 PROCgame
 140 PROCagain
 150 UNTILK$="N" OR K$="n"
 160 MODE6:PRINT:*FX220,27
 170 END
 180 :
 190 :
 200 DEFPROCgame
 210 REPEAT
 220 IFdice%<6plr%=plr%MOD2
+1
 230 IFplr%=2 AND arn% THEN
PROCcpth:ELSEPROCthrow
 240 poss%=0:FORnb%=1TO4:ds
tn%(nb%)=FNdestn(nb%)
 250 IFdstn%(nb%)THENposs%=
poss%+1:J%=nb%
 260 NEXT
 270 IFposs%=FALSE PROCtext
("Can't go"):GOTO220
 280 IFposs%=1THENPROCtext(
"No choice"):nbt=J%:GOTO300
 290 IFplr%=2 AND arn% THEN
PROCcmch:ELSEPROCchoose
 300 PROCmove
 310 UNTILhome%(1)=4 OR hom
e%(2)=4
 320 ENDPROC
 330 :
 340 DEFPROCmove
 350 PROCtext("Pig Number "
+STR$nb%)
 360 psn%=pig%(plr%,nb%)
 370 IFdstn%(nb%)=1 OR dstn
%(nb%)=116 pig%(plr%,nb%)=ds
tn%(nb%):PROCsplat(psn%):PRO
Cpig(dstn%(nb%)):PROCstsnd:E
NDPROC
 380 ops%=psn%:REPEAT:psn%=
FNnxps(psn%)
 390 IFFNblk(ops%) PROCspla
t(ops%):ELSEPROCdy(20)
 400 IFFNfull(psn%)=FALSE P
ROCpig(psn%):ops%=psn%:ELSEP
ROCdy(20)
 410 PROCstsnd:UNTILpsn%=ds
tn%(nb%)
 420 IFpsn%>120 home%(plr%)
=home%(plr%)+1
 430 odn%=INSTR(spc$(0),CHR
$psn%)
 440 IFodn%>6 PROCbog:ELSE
IFodn% PROCslide
 450 IF FNfull(psn%)<>plr%
PROCkof
 460 pig%(plr%,nb%)=psn%
 470 ENDPROC
 480 :
 490 DEFPROCkof
 500 LOCALJ%,temp%
 510 opnt%=plr%MOD2+1
 520 FORJ%=1TO4:IFpig%(opnt
%,J%)=psn% vt%=J%
 530 NEXT
 540 PROCsplat(psn%):PROCsp
lat(ops%):PROCpig(psn%):SOUN
D17,2,7,18
 550 pig%(opnt%,vt%)=108+vt
%+opnt%*8
 560 IFarn%=FALSE OR plr%=2
PROCtext("Gotcha!!!")
 570 temp%=nb%:nb%=vt%:plr%
=opnt%:PROCpig(pig%(opnt%,vt
%))
 580 IFarn% AND plr%=2 PROC
text("Ouch!!!")
 590 nb%=temp%:plr%=opnt%MO
D2+1
 600 ENDPROC
 610 :
 620 DEFPROCslide
 630 IF FNfull(psn%)<>plr%
PROCkof:ops%=psn%
 640 psn%=ASCMID$(spc$(1),o
dn%,1)
 650 IF FNblk(psn%) psn%=ds
tn%(nb%):ENDPROC
 660 PROCtext("Wheeeeeee!!"
):SOUND17,3,30,20
 670 IF FNfull(psn%)=FALSE
PROCsplat(ops%):PROCpig(psn%
)
 680 ENDPROC
 690 :
 700 DEFPROCbog
 710 LOCALJ%
 720 bog%=odn%-6:PROCsplat(
ops%):PROCepg(psn%):ops%=psn
%
 730 PROCtext("Here we go!"
):SOUND17,1,70,99
 740 FORJ%=RND(6)TO11
 750 REPEAT:psn%=ASCMID$(bo
g$,bog%,1):bog%=(bog%MOD6)+1
:UNTIL FNblk(psn%)=FALSE
 760 PROCepg(ops%):PROCepg(
psn%):ops%=psn%
 770 PROCdy(J%+J%):NEXT
 780 IF FNblk(psn%)=FALSE P
ROCepg(psn%):ELSE PROCpig(ps
n%)
 790 SOUND17,0,0,0
 800 ENDPROC
 810 :
 820 DEFPROCepg(G%)
 830 MOVEXT+(G%),YT(G%)-16:V
DU5,18,5,plr%,236,237
 840 ENDPROC
 850 :
 860 DEFPROCcpth
 870 IFdice%=6THENPROCtext(
"Me again")ELSEPROCtext("My
throw")
 880 dice%=FNdice
 890 PROCtext(" - a "+t$(di
ce%))
 900 ENDPROC
 910 :
 920 DEFPROCthrow
 930 IFdice%=6THENK$=FNkey(
" ","Go again")ELSEK$=FNkey(
" ","Press SPACE")
 940 dice%=FNdice
 950 PROCtext(" "+t$(dice%
))
 960 ENDPROC
 970 :
 980 DEFPROCchoose
 990 IFposs%=4 t$="Choose a
ny pig":k$="1234":GOTO1030
1000 PX=0:REPEAT:PX=PX+1:UN
TILdstn%(PX):t$="Pig "+STR$P
X:k$=STR$PX
1010 FORJX=PX+1TO4:IFdstn%(
J%) t$=t$+" or "+STR$J%:k$=k
$+STR$J%
1020 NEXT:t$=t$+" ?"
1030 nb%=ASCFNkey(k$,t$)-48
1040 ENDPROC
1050 :
1060 DEFPROCcmch
1070 PROCtext(w$(RND(10)-1)
)
1080 FORJX=1TO4
1090 IFdstn%(JX)=0 merit%(J
X)=-30000:ELSEmerit%(JX)=FNv
mt(dstn%(JX))-FNvlt(pig%(2,J
X))
1100 NEXT
1110 high%=merit%(1):opts%=
1:ce%(1)=1
1120 FORJX=2TO4
1130 IFmerit%(JX)<high%THEN
1160
1140 IFmerit%(JX)=high% opt
s%=opts%+1:ce%(opts%)=JX:GOT
O1160
1150 high%=merit%(JX):opts%
=1:ce%(1)=JX
1160 NEXT
1170 nb%=ce%(1):IFopts%>1 n
b%=ce%(RND(opts%))
1180 ENDPROC
1190 :
1200 DEFFNvmt(PX)
1210 IF INSTR(bog$,CHR$PX)
THEN=0
1220 IFPX>102 =0
1230 LOCALVX
1240 VX=FNtkbk(PX)
1250 QX=INSTR(spc$(1),CHR$P
X)
1260 IF QX IF FNfull(ASCMID
$(spc$(0),QX,1))<>1 VX=VX+FN
tkbk(ASCMID$(spc$(0),QX,1))
1270 =VX+(1+home%(2)/2)
1280 :
1290 DEFFNtkbk(GX)
1300 LOCALJX,VX
1310 FORJX=1TO6
1320 GX=GX-1+(GX=60):IFGX=0
JX=6:GOTO1340
1330 IF FNfull(GX)=1 VX=VX+
20-3*(PX<30)-6*(PX>81)-3*(PX
>59)+6-JX
1340 NEXT
1350 =VX
1360 :
1370 DEFFNirg(PX)
1380 IFPX>104 IFPX<116 =0
1390 LOCALJX,VX
1400 FORJX=1TO6
1410 PX=FNnxps(PX)
1420 IFPX>103 JX=6:GOTO1510
1430 IF FNblk(PX) THEN1510
1440 QX=INSTR(spc$(0),CHR$P
X)
1450 IF QX>6 THEN1510
1460 IF QX=0 THEN1500
1470 QX=ASCMID$(spc$(1),QX,
1)
1480 IF FNblk(QX) THEN1500
1490 IF FNfull(QX) VX=VX+20
-3*(QX>30)-3*(QX>59)-3*(QX>8
8)+6-JX
1500 IF FNfull(PX) VX=VX+20
-3*(PX>30)-3*(PX>59)-3*(PX>8
8)+6-JX
1510 NEXT
1520 IFdice%=6 VX=VX*1.5
1530 =VX*(1+home%(1)/2)
1540 :
1550 DEFFNvmt(PX):LOCALVX,Q
X
1560 IFPX>128 =-25-20+home%
(2)
1570 IFPX=116 =100+FNirg(PX
)
1580 IFPX>109 =5
1590 IFINSTR(spc$(1),CHR$PX
) VX=2*(PX=40)+4*(PX=11)+6*(
PX=95)+8*(PX=73)
1600 QX=INSTR(spc$(0),CHR$P
X):IFQX=FALSE THEN1640
1610 IFQX>6 =-40+(PX=37)-30
*(PX=49)-20*(PX=8)+30*(PX=92
)+50*(PX=70)
1620 QX=ASCMID$(spc$(1),QX,
1):IF FNblk(QX) THEN1640
1630 VX=-5*(PX=34)-10*(PX=5
)-20*(PX=89)-40*(PX=67)+40*(
PX=87)+60*(PX=65)+FNknsc(PX)
:PX=QX
1640 =VX+FNknsc(PX)+FNirg(P
X)-FNvbl(PX)
1650 :
1660 DEFFNvlt(PX)
1670 IF PX>124 =0
1680 IFPX=116 =FNirg(PX)-15
1690 IFPX>109 =20
1700 =2*(PX=40)+4*(PX=11)+6
*(PX=95)+8*(PX=73)-2*(PX=20)
-4*(PX=8)-6*(PX=49)-8*(PX=37
)+FNirg(PX)-FNvbl(PX)
```

Turn to Page 36 ▶

◀ From Page 35

```
 1710 :
 1720 DEFFNknsc(P%)
 1730 IF FNfull(P%)=FALSE =0
 1740 =128-5*(P%>30)-5*(P%>59)-5*(P%>88)
 1750 :
 1760 DEFFNdice
 1770 VDU5:tX=diceX-1
 1780 FORJX=RND(6)TO11
 1790 PROCblot:GCOL0,3:VDU25,0
 1800 tX=(tX+1)MOD6
 1810 PROCblot:GCOL0,plrX:VDU tX+49
 1820 SOUND1,4,100,1
 1830 PROCdy(JX*JX)
 1840 NEXT:IFtX=5 PROCgsnd(1)
 1850 =tX+1
 1860 :
 1870 DEFPROCblot
 1880 MOVEX%(133+tX),Y%(133+tX):GCOL0,0:VDU242,8
 1890 ENDPROC
 1900 :
 1910 DEFFNnxps(G%)
 1920 IF&%=29 IFplrX=2 =82
 1930 IF&%=116 =31
 1940 IF&%=58 IF plrX=1 =68
 1950 IF&%=59 =2
 1960 IF&%=88 IF plrX=2 =110
 1970 IF&%=102 IF plrX=1 =104
 1980 IF&%=103 =60
 1990 IF&%=109 =128+nb%
 2000 IF&%=115 =128+nb%
 2010 =G%+1
 2020 :
 2030 DEFFNdestn(nb%)
 2040 P%=pig%(plrX,nb%):LOCAL JX
 2050 IFP%>116 IF P%<121 IF diceX=6 IF FNblk(1)=FALSE =1
 2060 IFP%>124 IF P%<129 IF diceX=6 IF FNblk(116)=FALSE =116
 2070 IFP%>116 =0
 2080 IFP%>109 IF P%<116 IF P%+diceX>116 =0
 2090 IFP%>103 IF P%<110 IF P%+diceX>110 =0
 2100 FORJX=1TOdiceX:P%=FNnxps(P%):NEXT
 2110 IF FNblk(P%) IF INSTR(bog$,CHR$P%)=FALSE =0
 2120 =P%
 2130 :
 2140 DEFFNfull(HX)
 2150 =POINT(X%(HX)+72,Y%(HX)-20)MOD3
 2160 :
 2170 DEFFNblk(IX)
 2180 =(FNfull(IX)=plrX)
 2190 :
 2200 DEFPROCstsnd
 2210 SOUND1,4,52,1
 2220 SOUND1,4,80,1
 2230 ENDPROC
 2240 :
 2250 DEFPROCgsnd(HX):LOCALC%
 2260 FORC%=0TOHX-1
 2270 SOUND1,4,52+8*C%,3
 2280 SOUND1,4,72+8*C%,3
 2290 SOUND1,4,88+8*C%,3
 2300 SOUND1,4,100+8*C%,3
 2310 NEXT
 2320 SOUND1,4,100+8*(HX-1),7
 2330 ENDPROC
 2340 :
 2350 DEFFNkey(k$,t$)
 2360 WX=TIME+100:A=FX15,1
 2370 PROCtext(t$)
 2380 i$=INKEY$(0):IFi$<>"" AND INSTR(k$,i$) THEN2470
 2390 IFi$="@" SOUND0,0,0,0:*FX210,1
 2400 IFi$="S": *FX210,0
 2410 IFWX>TIME THEN2380
 2420 PROCtext("Come on"):SOUND1,4,32,5:time%=TIME+18
 2430 i$=INKEY$(0):IFi$<>"" AND INSTR(k$,i$) THEN2470
 2440 IFi$="@" SOUND0,0,0,0:*FX210,1
 2450 IFi$="S": *FX210,0
 2460 WX=TIME+100:GOTO2370
 2470 time%=TIME:=i$
 2480 :
 2490 DEFPROCdy(del%)
 2500 LOCALK%:FORK%=1TO10*del%:K%=NEXTK%
 2510 ENDPROC
 2520 :
 2530 DEFPROCtext(P$)
 2540 LOCALJX
 2550 VDU4:IF LEFT$(P$,1)="" THEN2600
 2560 REPEATUNTILTIME>time%
 2570 FORJX=1TOLEN(last$)STEP-1:PROCdy(1)
 2620 PRINTTAB(JX,0)LEFT$(P$+" ",19-JX);
 2630 NEXT:last$=last$+P$:VDU5
 2640 IFtime%>TIME THENtime%=time%+4+LENP$ELSEtime%=TIME+4+LENlast$*25
 2650 ENDPROC
 2660 :
 2670 DEFPROCsplat(G%)
 2680 MOVEX%(G%),Y%(G%):VDU5,18,0,3
 2690 IF&%>116 PROCbase:ENDPROC
 2700 IF&%>103 AND G%<116 PROCring:ENDPROC
 2710 odn%=INSTR(Q$,CHR$GX)
 2720 IFodn%=FALSE PRINTb$:ENDPROC
 2730 IFodn%>8 GCOL0,0:PRINTb$;:GCOL0,3:VDU8,8,11,228,229,8,8,10,230,231:ENDPROC
 2740 PRINTb$;::VDU18,0,odn%OIV3,8,8,25,0,24;16;243+odn%+(odn%>4)+(odn%=8)
 2750 ENDPROC
 2760 :
 2770 DEFPROCbase
 2780 VDU18,0,0,242,243:MOVEX%(G%),Y%(G%):VDU10,242,243:MOVEX%(G%),Y%(G%)
 2790 IF&%>124 GCOL0,2 ELSE GCOL0,1
 2800 VDU237,253:MOVEX%(G%),Y%(G%):VDU10,234,235
 2810 ENDPROC
 2820 :
 2830 DEFPROCring
 2840 PRINTb$;::VDU8,8,11
 2850 IF&%>109 GCOL0,2 ELSE GCOL0,1
 2860 VDU228,229,8,8,10,230,231
 2870 ENDPROC
 2880 :
 2890 DEFPROCpig(G%)
 2900 MOVEX%(G%),Y%(G%)-16:VDU5,18,0,plrX,236,237:MOVEX%(G%),Y%(G%)-16:VDU18,0,0,237+nb%
 2910 ENDPROC
 2920 :
 2930 DEFPROCscreen
 2940 VDU19,1,3;0;19,2,6;0;19,3,2;0;23,1,0;0;0;0;
 2950 FORJX=1TO31:PRINTSTRING$(20,CHR$25#0);:NEXT
 2960 GCOL0,0:MOVE0,36:DRAW1271,36:DRAW1271,1023:GCOL0,3
 2970 VDU29,0;31;28,0,31,19,31
 2980 FORJX=1TO132:PROCsplat(JX):SOUND17,4,JX+10,3:NEXT
 2990 MOVE287,928:PROCfile("")";MOVE815,864:PROCfile(">");MOVE951,96:PROCfile("<"):MOVE351,160:PROCfile("<")
 3000 PROCgsnd(3)
 3010 MOVE447,512:FORJX=1TO3:GCOL0,JX:PRINT"Go-Pig";:PLOT0,-392,0:NEXT
 3020 ENDPROC
 3030 :
 3040 DEFPROCfile(f$)
 3050 GCOL0,0:VDU242,243:PLOT0,-144,0:GCOL0,3:PRINTf$;f$;:PLOT0,-96,0:PRINTf$
 3060 ENDPROC
 3070 :
 3080 DEFPROCreset
 3090 PROCblot:GCOL0,3:VDU25,0
 3100 FORplrX=1TO2:FORnb%=1TO4
 3110 PROCsplat(pig%(plrX,nb%))
 3120 pig%(plrX,nb%)=108+8*plrX+nb%
 3130 PROCpig(pig%(plrX,nb%))
 3140 NEXT:home%(plrX)=0:NEXT:plrX=2:diceX=1
 3150 arm%=(VALFNkey("12","One player or two?"))MOD2
 3160 K$=FNkey("YyNn","Colours O.K.?")
 3170 IF K$="Y" OR K$="y" ENDPROC
 3180 PROCtext("Press SPACE to set")
 3190 PROCgc("Background",3)
 3200 IFarm%THEN3240
 3210 PROCgc("Player 1",1)
 3220 PROCgc("Player 2",2)
 3230 GOTO3160
 3240 PROCgc("Your colour",1)
 3250 PROCgc("My colour",2)
 3260 GOTO3160
 3270 :
 3280 DEFPROCgc(t$,plrX)
 3290 PROCtext(t$):*FX15,1
 3300 LX=1:REPEAT
 3310 VDU19,plrX,LX;0;:LX=(LX MOD7)+1
 3320 UNTILINKEY(100)=32
 3330 ENDPROC
 3340 :
 3350 DEFPROCinstruct
 3360 VDU19,1,3;0;12,23,1,0;0;0;0;:PRINTTAB(16)"Go-Pig"
 3370 PRINT" is a board game with the computer taking the place of the board, the dice and (if you wish) your opponent."
 3380 PRINT"You press SPACE to throw the dice.""You need a six to get a pig out of its starting sty. You can only move one pig on each throw, but you get an extra throw if you throw a six."
 3390 PRINT"You can't have two pigs on one tussock but if you finish on an opponent pig youknock it back to the start - unless it is in a bog!""Some tussocks are slippery, which may help or not."
 3400 PRINT"If you land in a bog you will probably end up in another. If there is a n opponent pig there you will knock it back to the start."
 3410 PRINT"You must throw an exact number to get a pig home. The winner is the first with four pigs there.""
 Confused? ";
 3420 ENDPROC
 3430 :
 3440 DEFPROCinit
 3450 *FX220,127
 3460 DIMX%(138),Y%(138),dstn%(4),pig%(2,4),home%(2),mark%(4),ce%(4),t$(6),w$(9),sp$(1)
 3470 RESTORE3770:FORJX=1TO138:READX%(JX),Y%(JX):NEXT
 3480 b$="+CHR$8+CHR$8+CHR$10+"
 3490 FORplrX=1TO2:FORnb%=1TO4:pig%(plrX,nb%)=108+8*plrX+nb%:NEXT:NEXT
 3500 last$=STR!NG$(20," "):last$="":time%=0:tX=0:JX=RND(-TIME)
 3510 FORJX=1TO6:READt$(JX):NEXT:FORJX=0TO9:READw$(JX):NEXT
 3520 bog$=CHR$8+CHR$20+"X!F\":Q$="AW"+CHR$1+":fnP"+CHR$29+bog$:spc$(0)=CHR$5+""ACW Y"+bog$:spc$(1)=CHR$11+"("+CHR$14+"I+"
 3530 FORJX=&C00TO&CD7:READ?JX:NEXT
 3540 FORJX=1TO4:READA%,B%,C%,D%,E%,F%,G%:ENVELOPE JX,AX,B%,C%,D%,E%,F%,G%,126,0,0,-126,126,126:NEXT
 3550 PRINT"Press SPACE"
 3560 REPEATUNTILINKEY(-99)
 3570 ENDPROC
 3580 :
 3590 DEFPROCagain
 3600 PROCgsnd(5)
 3610 IF arm% AND plrX=2 PROCtext("Beat you!") ELSE PROCtext("Well done!")
 3620 PROCdy(250):PROCtext("
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

ACORN IN ACTION

A totally new experience for show visitors

at the Royal Horticultural Hall, Westminster, London SW1

ELECTRON & BBC MICRO USER SHOW

10am-6pm Friday May 13
10am-6pm Saturday May 14
10am-4pm Sunday May 15

You'll find the very latest software and peripherals for the complete Acorn range at the Electron & BBC Micro User Show. But this time there'll be so much more to enjoy. Acorn In Action will demonstrate some of the truly amazing projects currently involving the machines . . .

SEE

- ★ A spectacular laser light show controlled by a BBC Micro. (Saturday only)
- ★ The research work on the BBC Micro that has helped to bring new hope to sufferers of the eye disease glaucoma. (Friday and Sunday)
- ★ A program developed by an amateur astronomer to locate distant galaxies. (Saturday and Sunday)
- ★ The Beeb system being used by doctors at Guy's Hospital to provide a breakthrough in the treatment of arterial disease. (Saturday and Sunday)

PLUS watch your own heartbeats displayed, measure your manual dexterity and hear your own voice backwards – all courtesy of a BBC Micro.

Take your seat in the Archimedes Demonstration Theatre run by Acorn's own experts. Thirty minute special introductory courses to the new machine will be held on the hour, every hour throughout the three days. Price just £1.

It all adds up to a fantastic day out for the whole family!

Avoid the queues! Get your ticket in advance – and SAVE £1 A HEAD!

Post to: **Electron & BBC Micro User Show Tickets, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

ELECTRON & BBC MICRO USER SHOW

Royal Horticultural Hall
Westminster
London SW1
May 13-15, 1988

Advance ticket orders must be received by Wednesday, May 4, 1988.

Admission at door: £3 (adults), £2 (under 16s)

Please supply:

___ Adult tickets at £2 (save £1) £____
(Order four adult tickets, get the fifth FREE!)

___ Under 16s tickets at £1 (save £1) £____
(Order four under-16s tickets, get the fifth FREE!)

Total £____

☐ I enclose a cheque made payable to Database Exhibitions

☐ Please debit my Access/Visa card no:

Expiry date: /

Name _____ Signed _____

Address _____

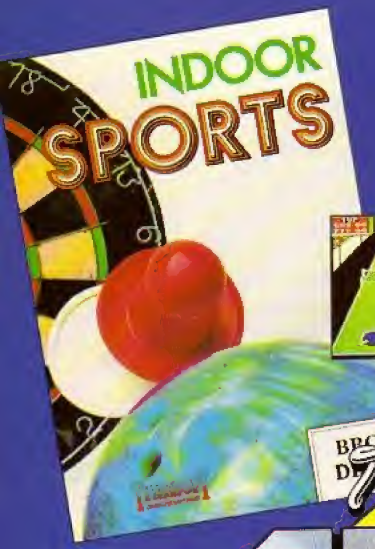
_____

Postcode _____

A338

PHONE ORDERS: Ring Show Hotline: 0625 879920
PRESTEL ORDERS: Key *89 then 614568383
MICROLINK ORDERS: Mailbox 72:MAG001

Please quote credit card number and full address



The New SPRING SCREEN STARS

INDOOR SPORTS - Darts, Air Ball, Ten Pin Bowling and Table Tennis. These games are every bit as challenging as the real thing, with the ultimate in realism and game play.
BBC/Master/Electron Cass £9.95

BOULDER DASH - This classic game from First Star in America is another superb conversion by Tynesoft.
BBC/Master/Electron Cass £9.95

SAIGON - The realism of war at last comes to your Acorn in the shape of Saigon. The task of the game is to rescue your Platoon members from their Vietcom captors. A mission you will find hard to refuse.
BBC/Master/Electron Cass £9.95

TYNESOFT
COMPUTER SOFTWARE

Tynesoft Computer Software, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE

Go-Pig listing

```
Another?")
 3630 REPEAT:K$=GET$:UNTILIN
STR("YyNn",K$)
 3640 ENDPROC
 3650 :
 3660 :
 3670 IFERR<>17THEN3720
 3680 PROCtext("Restart?")
 3690 *FX15,1
 3700 REPEAT:K$=GET$:UNTILIN
STR("YyNn",K$)
 3710 IFK$="Y" OR K$="y" GOT
O110
 3720 MODE6:*FX220,27
 3730 PRINT'
 3740 REPORT
 3750 PRINT" at line ";ERL
 3760 END
 3770 :
 3780 :
 3790 DATA0,736,48,800,24,86
4,8,928,104,944,144,880,160,
816,224,756,288,816,304,880,
312,944,408,960,504,972,592,
940,688,972,776,972,872,956,
968,972,1064,972,1160,956,11
44,892,1160,828,1144,764,113
6,700
 3800 DATA1108,640,1056,576,
1056,512,1056,448,1040,384,1
056,320,1120,256,1136,192,11
52,128,1056,112,1024,176,100
8,240,944,300,880,240,864,17
6,848,112,752,96,656,84,568,
116,482,84,384,84,288,100,19
2,84,96,84
 3810 DATA8,100,16,164,0,228
,16,292,32,356,60,416,96,480
,96,544,112,608,128,672,112,
736,216,672,312,668,376,752,
408,816,424,880,520,884,616,
868,712,880,728,816,744,752,
808,692,872,752,888,816,920,
880,1016,896
 3820 DATA1032,832,1016,768,
984,704,968,640,952,576,952,
512,952,448,952,384,856,368,
792,304,760,240,736,176,640,
172,544,188,448,176,440,240,
424,304,360,364,296,304,264,
240,248,176,152,160,136,224,
152,288
 3830 DATA184,352,200,416,20
0,480,216,544,216,608,312,54
4,376,608,440,672,488,736,57
6,760,624,708,856,512,792,44
8,728,384,680,320,592,296,54
4,348,1160,320,0,668,0,608,0
,548,0,488,536,588,624,588,7
12,588
 3840 DATA624,648,1160,388,1
160,448,1160,508,1160,568,63
2,468,544,468,456,468,544,40
8,727,648,663,376,679,224,47
1,376,551,640,519,880
 3850 DATAone,two,three,four
,five,SIX!
 3860 DATALet me think,Errr.
....,Hang on a sec,Just a mo
ment,Now then..Let's see,Int
eresting!,Mmmmmm!,Easy,Well
 now...,Wait a bit..
 3870 DATA22,127,63,127,255,
255,127,255
 3880 DATA128,224,192,224,24
0,240,224,240
 3890 DATA255,127,255,255,12
7,63,127,22
 3900 DATA240,224,240,240,22
4,192,224,128
 3910 DATA22,104,32,64,128,1
28,8,128
 3920 DATA128,96,64,32,16,16
,0,16
 3930 DATA128,0,128,128,64,3
2,184,22
 3940 DATA16,8,16,16,32,64,9
6,128
 3950 DATA255,192,128,128,12
8,128,128,128
 3960 DATA240,48,16,16,16,16
,16,16
 3970 DATA128,128,128,128,12
8,128,192,255
 3980 DATA16,16,16,16,16,16,
48,240
 3990 DATA78,191,127,127,127
,63,59,17
 4000 DATA192,224,96,240,224
,128,0,0
 4010 DATA0,4,12,4,4,14,0,0
 4020 DATA0,8,20,4,8,28,0,0
 4030 DATA0,28,2,12,2,28,0,0
 4040 DATA0,4,12,20,30,4,0,0
 4050 DATA255,255,255,255,25
5,255,255,255
 4060 DATA240,240,240,240,24
0,240,240,240
 4070 DATA30,30,14,26,58,96,
64,0
 4080 DATA0,4,12,152,176,224
,248,240
 4090 DATA16,56,84,84,16,16,
16,16
 4100 DATA8,4,2,127,2,4,8,0
 4110 DATA16,16,16,16,84,84,
56,16
 4120 DATA0,16,52,64,254,64,
32,16
 4130 DATA136,0,34,0,136,0,3
4,0
 4140 DATA3,-2,4,-2,5,5,5
 4150 DATA3,-2,-4,-8,5,5,5
 4160 DATA1,3,2,1,45,55,20
 4170 DATA4,2,-2,0,1,1,0
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

QUAL-SOFT

WORLD OF SOCCER

Sports simulations

ARE YOU A POTENTIAL 1st DIVISION MANAGER?
ARE YOU A POTENTIAL ENGLAND MANAGER?

Football management is not a mental arithmetic exercise. Deciding whether a skill level of 6 is a better choice than a skill level of 4 has nothing to do with a knowledge of soccer. Football management is about judgement; YOUR JUDGEMENT! Judgement about a players skills. Judgement of how skills combine to make a successful team. And judgement of the performance of the team on the field of play. Our "WORLD OF SOCCER" games are not so much computer games as computer SIMULATIONS of the world of the soccer manager.

DARE YOU TEST YOURSELF?

SOCCER SUPREMO

A LEAGUE MANAGEMENT SIMULATION

TAPE 1
6 Seasons
League Division 1
The F.A. Cup

TAPE 2
European Cup
U.E.F.A. Cup
Cup Winners Cup

MEXICO '86

A WORLD CUP MANAGEMENT SIMULATION

TAPE 1
Friendlies
World Cup
Qualifiers

TAPE 2
World Cup Finals
Phase 1 (groups of 4)
Phase 2 (last 16 knockout)

STILL THE ONLY ELECTRON SOCCER MANAGEMENT GAMES WITH GRAPHICS!

***SPECIAL OFFER:** Soccer Supremo & Mexico '86 (4 tapes and 2 manuals packaged as 2 games) £14.95*

Both games are sent by return post, 1st class. Access authorisation accepted over the 'phone

QUAL-SOFT Tel: 0438
Dept. EU, 721936
18 Hazlemere Road
Stevenage SG2 8RX

Please supply:
Soccer Supremo ☐ £9.95
Mexico '86 ☐ £9.95
SS & M'86 ☐ £14.95

Name:
Address:
Access No. (if applicable)

Adventures by Pendragon

The end is nigh for Woodbury

IT appears that we have seen the last adventure releases from both Potters and Hall-Soft.

While this news will not disappoint many readers, if the quality of those companies' games are anything to go by – **Twin Orbs of Aalinor** excepted – the following snippit might.

After a disastrous year in 1987, Shards has decided to cease trading. This is for me the most disappointing news I have heard on the adventure front.

Shards has produced Electron software since the machine's inception, and it is a crime to see it fold.

Although Steve Maltz's adventures didn't appeal to everyone, **Woodbury End** will remain firmly in my all time Top 10.

I suggest that if you wish to obtain copies of these adventures before they disappear into oblivion, you should write to Steve at 189 Eton Hill, Ilford, Essex 1G1 2UQ.

While you're at it, you could suggest that he reconsiders his decision.

However, for every death there is a birth, which brings me to Topologika.

I mentioned this company's disc releases in February's column and apologise for stating the price to be £17; they are, in fact, only £9.95 each.

If you have a Master Ram Board or a Jafa Mode 7 adapter with a 5.25in disc drive, the revamped **Countdown to Doom, Acheton, Philosopher's Quest** and **Kingdom of Hamil** are essential buys.

Meanwhile, Peter Killworth is writing the long-awaited sequel to Countdown, **Return to Doom**. Topologika – formerly Chalksoft – has also promised four new adventures on disc this year.

Many readers have asked for a list of the best 5.25in disc-only adventures currently available. You can see them in the adjoining panel. Once again, Slogger's Master Ram Board is an essential addition to your Electron, as all but one require 64k to run.

Another price mistake is that of Adventure Soft UK's **Scoops** which costs £9.99 and not £7.95, as previously stated.

I have sent a copy of this four-game compilation to Robert Henderson as a token of thanks for the copy of **Eye of Zoltan** which he kindly sent in response to my recent plea.

Many of you will have

Readers' Hall of Fame

Operation Safras – *Harry Bastien* (continued from last month)

GO TO YORK – EXAM SHED – COMBINATION IS 3876 – GO TO CARLISLE – ASK MAN – GO TO MANCHESTER – DROP OBJECTS AND GET LADDER – CLIMB LADDER – OPEN WINDOW – DROP LADDER – GO TO DERBY – ASK MAN – GO TO NOTTINGHAM – EXAM WALL – EXAM BIN – EXAM ENVELOPE – EXAM STAMP – GET STAMP – GO TO SOUTHAMPTON – SELL STAMP – GO TO LEEDS – GIVE MONEY IN CASINO – GO TO READING – ENTER BUNKER – EXAM ROOM – GET SWORD.

Rearrange the letters of carethemyn to give you the final clue. There are a few red herrings, such as the cheque in the envelope and the book of false information – beware of them.

Enthar Seven – *The Boss* (continued from last month)

To escape from the terminal nightmare you must wake up. Carefully search your surroundings and you will find that you are bound with webs in the giant spider's larder.

In order to extricate yourself, you must rub the web with a nail several times. You are now free to travel South through the arch. You were fortunate to have left your torch switched on, so you have enough light to collect your belongings.

At one location lies a perplexing maze with various coloured exits. It is now that the sweet has its second use. Using a suck it and see technique the sweet will reveal different colours as it becomes smaller. Each one will respond to a maze exit. Follow a white, red, blue, yellow, orange route to escape.

Switch off your torch to save its power. At the foot of the staircase you will soon discover a small alcove and a vial of liquid poison, which should be collected. Now drop through the hole in the floor and you will find yourself back in familiar territory.

A quick journey Northeast will uncover a small twig which is worth getting. Now return to the door of the tree and wear the helmet again to traverse the high-altitude ramp. Upon reaching the platform you should stand on the flipper plate to be transported back to the forest.

At ground level, remove your helmet and retrace your steps through the forest maze to the teleport booth. Back at the command centre you are now in the final stages of this adventure with only sector five and the last bit of sector two to conquer.

noted Jonathan Page's letter in January's Micro Messages concerning the so-called inflated marks given by reviewers to software in Software Surgery.

Jonathan's letter follows hot on the heels of others of the same view which I have received in my mailbag.

In the course of a year I probably receive more than 30 adventures for review or appraisal from software companies.

Competition for space means that damning reviews are omitted automatically and even reviews of so-so games rarely reach our pages.

To prove a point I hereby list my vile pile of 1987, reviews of which never passed the initial sorting stage.

Adventures which in my humble opinion were not worth publishing included, Warcry, Return of Flint, The Banished Prince, The Druids Circle, Mission XP2 and The Archers.

I am sorry if that sounds callous, but if good software is to flourish, a certain amount of weeding has to take place.

The number of adventures released which contain annoying bugs and garbled messages has not decreased. Once again Adventure Soft UK is one of the culprits.

It appears that there are many bugged copies of both Buckaroo Banzai and Temple of Terror circulating. I have two copies of each game, and the most recent in each case appears trouble free.

If you have an earlier, bugged copy of either of these games I suggest you return them to US Gold, Units 2/3 Holford Way, Holford, Birmingham, for an immediate replacement.

Finally, until the bugs leave Bedquilt, happy adventuring.

1	Enthar Seven	Robico
2	Acheton.....	Acornsoft/Topologika
3	Egyptian Adventure	Duckworth
4	Dreamtime.....	Heyley
5	Kingdom of Hamil	Acornsoft/Topologika

Pendragon's top five 5.25in disc adventures

Adventurer's Glossary (continued from last month)

Fairy: Is it a tooth Fairy?
Fallen rocks: A blockage which will need investigating or climbing.
Fallen star: Must be worth catching, but don't burn your hands.
Figurine: Surely a treasure.
Firefly: A source of light.
Fish: Could be a red herring or even a source of food.
Flames/fire: Probably need extinguishing with water. If the fire is elemental it could be a source of life and power.
Food: Eat it.
Frog: To kiss or not to kiss?
Fruit: Food.
Furniture: As a general guide, sit on chairs, but with care, examine desks and tables, open drawers, enter cupboards, move rugs and open chests.

Problems Solved

Michael Hardy, Christine Beckingham and Lee Langford are all stuck in the early stages of Epic's **Quest for the Holy Grail**. To escape unscathed from the woodcutter's house they should hide the axe under their tunic.

At a later stage in the same game Daniel Gilbert must take care to cut the rope before making the raft, so that he has a means of tying the raft to the tree on the island.

In **Castle Frankenstein**, Colin Campbell and his dad should wear the tin hat while outside the castle walls to avoid a splitting headache.

In **Wheel of Fortune**, Joanne Bull will find the

Turn to Page 42 ►

Philosopher's Quest *– John Tipper* – (continued from last month)

When you reach the beach go West then North into the cliff. As long as you have the cheese you can take the mouse, which in turn will frighten the elephant.

Carry on to the cliff and get the dog from the room beyond the tusk. Collect the tusk upon your return, then go to the bungalow and give the lady her dog. It won't be the right one, but don't worry.

Return to the shop and leave any treasures which you have collected. Now go to Piccadilly Circus. Enter the Danger Trap locations using the jump and crawl process, and in the room where you found the trophy say SPOT. Return to Piccadilly Circus, get the bottle and matches and leave them outside the shop.

Visit the bungalow again. Give the lady her second dog then return once again to the shop. Travel East until you reach the kennel room. Now get the dog and go Westwards from the shop until you pass under the paint dropper which will render the dog visible.

Take this dog to the old lady and follow her when she journeys North. Retrieve the will and return to the shop. Get the bottle of ink, go by the paint dropper and move

down. Go East and fill the bottle with ink. The maze can be easily mapped.

Take the will to the solicitor's office. Leave East then come back and collect the cheque. get the platypuss and leave it with the cheque at the shop.

Go back to the cheese location and move South to get the chain. Move back to Piccadilly Circus and go Southwest then West towards the miner. Switch off your light and journey by matchlight. When you have been bored to sleep by the miner and woken again, switch on your lamp and travel West. Get the albatross and return to Piccadilly Circus.

◄ From Page 41

dragon in the caves to the South of the valley. She should throw water over it to extinguish its fire. The basket and snake should be placed at the entrance to the troll's cave.

It seems that the old Epic adventures are gaining a resurgence of interest since their prices were reduced. They certainly remain excellent adventures even by today's higher standards.

For the sake of the sanity of Chris Richards, A. Bailey, Martin Bentley, Peter Noble, Darren Waterfield and many others, there now follow some hints to help overcome part one of Melbourne House's **Dodgy Geezers**:

Examine all Wanted posters to establish the members of your gang. Go East from the starting location, then South where Bullet-Proof George will give you a piece of paper. Read this, as it contains Little Ken's phone number.

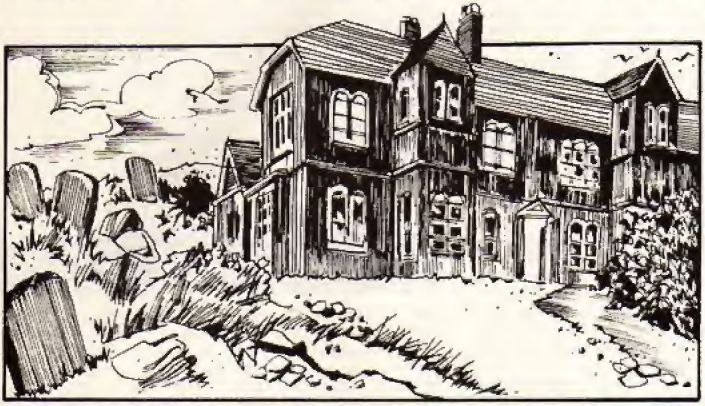
Phone him from the Korner Kaff. Reply *Little Ken* to the question you are asked. Wait for him to give you a tip for the dog race. Pass this on to Tweedle.

Go and collect your winnings and the pick-axe from the construction site, and leave them both outside the snooker club. Be careful with your timing.

Meet Tweedle in the warehouse, hang around then search the place thoroughly. The matches provide entrance to the club. The dobermans need to be put to sleep. Enter the club and buy generously. Hang around in the graveyard at the witching hour.

Hi-Score is where you would expect him to be. Get a book from the library based on the advice given by Soapy, Tweedle and Cracker.

Listen to the pub phone at lunch time. Let Mr Video in on the job, collect the pick-axe and meet the Geezers in the alley.



NEW

ROMPLUS-144

from JAFA SYSTEMS

UP TO 144K OF ROM AND RAM IN A PLUS ONE SLOT

The ROMPLUS-144 is fully buffered and has 8 sockets to hold either 8 ROMS or 7 ROMS plus a 32K RAM. The ROMs are individually software selectable via an additional operating system ROM supplied in the unit. The RAM is configured as 2 x 16K sideways ROMs, each of which can be loaded either from disc/tape or from other ROMs, for applications that require two ROMs simultaneously. If both Plus One slots are available, 2 of these units can be used to hold 288K of ROM/RAM!

Price Only £39 + £15 if RAM required

"Here at last is a true Mode 7 adaptor . . . and very impressive it is too."–*E.U., Aug. '87*
"A quality product well made . . . buy it."–*A.&B. Computing, Feb. '88*

ELECTRON MODE 7 ADAPTOR

Full hardware implementation gives the Electron a true MODE 7 display.
1K screen, direct character pokes, full teletext character set.
Compatible with Wordwise Plus.
Compatible with Prestel/Micronet and Teletext (Ceefax/Oracle) adaptors.
Compatible with long MODE 7 adventure games.
TV and RGB outputs.
Screw-in case fits between Electron and Plus One and protects connectors.
Available as a kit – bare pcb, parts list and layout.

Prices: Full Unit–£89, Kit–£25 + £10 for case

Still available –

The Original E2P Second Processor Kit

Bare pcb, instruction booklet, software on cassette, 3.5" disc or ROM
"An excellent add-on."–*A.&B. Computing, April '86*

Prices: With software on cassette – £15, 3.5" disc or Rom – £20

ALL PRICES ARE INCLUSIVE OF POSTAGE, ETC.
Please allow 28 days delivery

JAFA SYSTEMS

9 Lon-y-Garwa, Caerphilly, Mid-Glamorgan CF8 1NL
Telephone: (0222) 887203

SEE US AT THE E.U. SHOW 18-20 MARCH

PROJECT EXPANSIONS for the ELECTRON

NEW

PLUSCOM

A UTILITY ROM

40 commands on a 16k rom–a command for everyone from error extension to character designer ·· PRICE >> £14·95

SOUND EXPANSION

THE 4 CHANNEL SOUND CARTRIDGE

at last — bbc sound command capabilities ··· plugs into the plus1 — limited offer ··· SPEECH! worth £9·99-FREE

PRICE >> £39·95

ALSO:

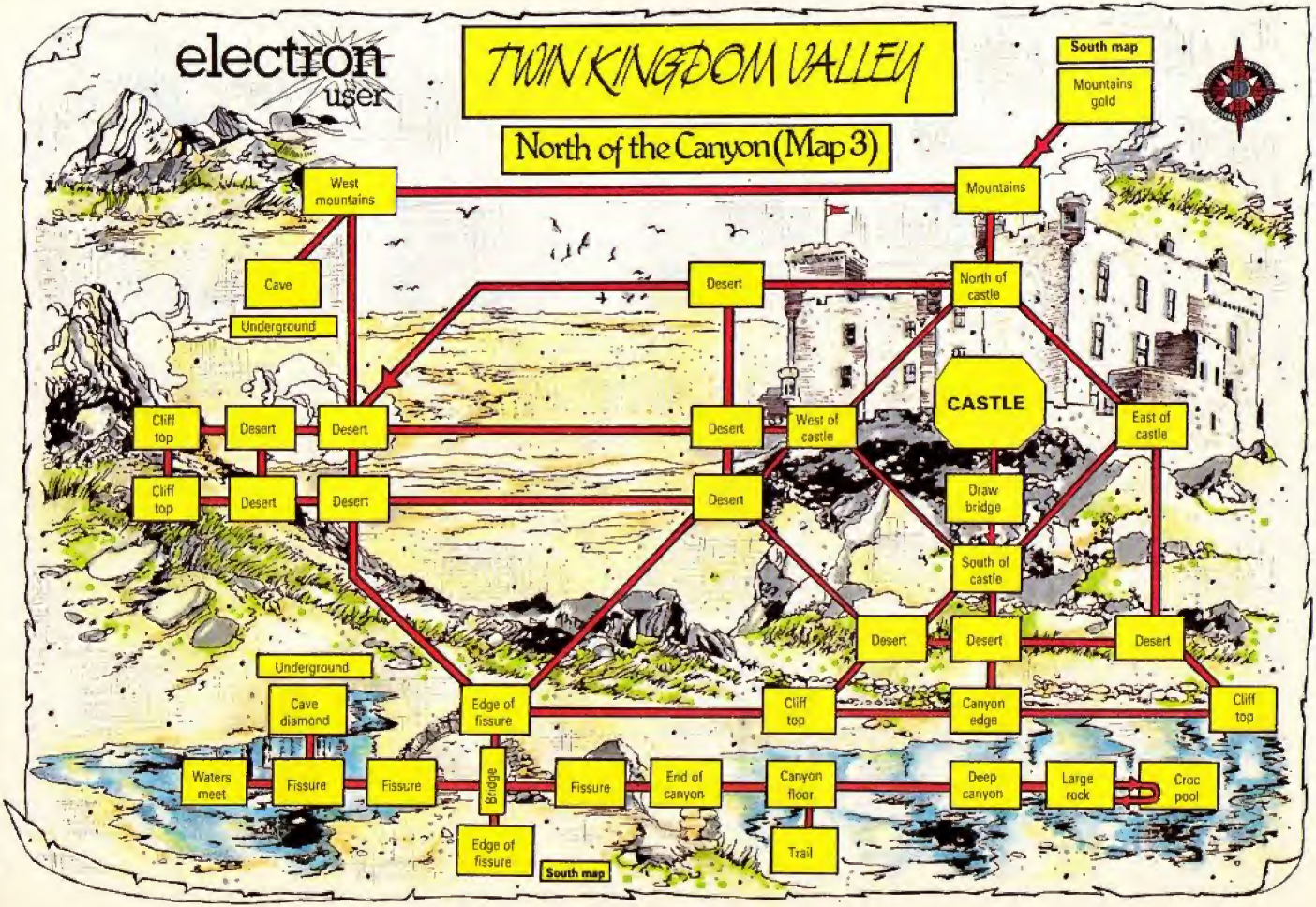
USER PORT inc ROM socket £29·95
EPROM Programmer £34·95

all prices+VAT

NOW AVAILABLE FROM

M&S ASSOCIATES

40 Meyrick Drive, Newbury, Berkshire RG14 6SX. (0635) 45774


electron user
TWIN KINGDOM VALLEY
North of the Canyon (Map 3)
South map
Mountains gold
West mountains
Mountains
Cave
Underground
Desert
North of castle
CASTLE
Cliff top
Desert
Desert
Desert
West of castle
East of castle
Cliff top
Desert
Desert
Desert
Draw bridge
South of castle
Underground
Desert
Desert
Desert
Cave diamond
Edge of fissure
Cliff top
Canyon edge
Cliff top
Waters meet
Fissure
Fissure
Bridge
Fissure
End of canyon
Canyon floor
Deep canyon
Large rock
Croc pool
Edge of fissure
Trail
South map

Learning CAN be fun

- Use your Electron to teach and amuse your children at the same time.
- Three packages crammed full of educational programs – and so easy to use!
- Each program has been educationally approved after extensive testing in the classroom.

ONLY £4.95 tape £5.95 3½" disc

Ages 2-5

Alphabet
Colours
Counting
House
Magic Garden
Matchmaker
Numbers
Pelican
Seaside
Snap

PELICAN
Teach your children to cross the road safely at a Pelican crossing

HOUSE
Select the colours to draw a house – hours of creative entertainment

Ages 5-8

Balance
Castle
Derrick
Fred's Words
Hilo
Maths Test
Mouser
Number Signs
Seawall
Super Spell

NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten

BALANCE
Learn maths the fun way. Type in the answer to balance the scales

Ages 8-12

Anagram
Codebreaker
Dog Duck Corn
Guessing
Hangman
Maths Hike
Nim
Odd Man Out
Pelmanism
Towers of Hanoi

HANGMAN
Improve your child's spelling with this fun version of the popular game

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER PLEASE USE THE FORM ON PAGE 53

START OF A NEW SERIES

STAYING IN THE SHADOWS

CHRIS NIXON on how to utilise the hidden memory of Slogger's Master Ram Board

OWNERS of the Electron Master Ram Board from Slogger will already be aware of the vast increase in the power of their computer.

But have they ever wondered what else can be done with this marvellous add-on?

In 64k mode the Electron always has an area of memory left over, which is only ever used as a printer buffer by Slogger's Expansion Rom 2.0 – if you have it.

In this new series we shall explain how to use this extra memory to full effect, and in the process add a whole host of new utilities to your Electron's repertoire.

Later in the series we will present a program which can store and retrieve strings of text from this area, and also a twin file editor which allows you to edit two Basic programs in memory at once, one in normal memory and the other held in shadow ram.

To set the scene, a little background information is needed before tackling the ram board proper. Leaving aside the turbo driver part of the board, in 64k mode what you have is basically an extra 32k of memory called the shadow ram.

But as the Electron's memory already includes 32k of ram, the 16k Basic rom and the 16k operating system rom – making 64k altogether – and the 6502 processor simply can't access memory higher than 64k, how is it done?

Well, the system which allows the extra 32k provided by the Master Ram Board to be used by the 6502 CPU is known as paging. This simply means that the 32k shadow ram inside the Master Ram Board completely replaces the Electron's own 32k memory.

However, all screen output is directed only to the Electron's original memory instead of the new ram, thus freeing up to 20k more memory for your Basic programs, word processing and so on.

The upshot of this paging technique is that you will always have a massive 28k – 32k minus operating system workspace – for programming and other uses, regardless of the screen mode used.

It is important to remember that the Electron is completely unaware of any change from normal operations. This is because of Slogger's clever memory controller chip, which effectively acts as a set of railway points.

Whenever the operating system attempts to print on the screen, a new pathway is temporarily switched in line for the data signals to follow.

This path leads to the

Turn to Page 46 ▶

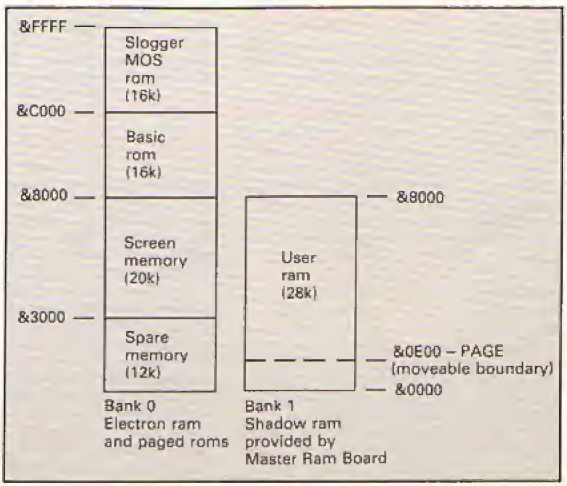


Figure 1: Electron memory map in 64k mode

◀ *From Page 45*

Electron's old 32k of memory, and results in text and graphics being written soley to this memory bank.

However, the rest of the time this extra pathway is simply not there, allowing your programs and data to extend right into what would normally have been considered as the screen memory, but which in fact is inside the new bank of 32k provided by the ram board.

For the sake of clarity, from now on I shall refer to the Electron's original 32k of ram as bank zero, and Slogger's new 32k of ram as bank one.

What we therefore have is an Electron with a full 64k of ram, but split between two separate banks.

Bank zero is now only ever used as screen memory, so depending on the current screen mode there is anything from 12k to as much as 24k of bank zero left unused by the Electron.

HIMEM will always be at &8000 – the old top of screen ram – thus giving us our 28k of usable ram.

There is only one problem associated with any shadow ram environment. Arcade games will not work if they attempt to directly peek and poke the screen ram.

If you think about it, you can see why. What is happening is that bank one – Slogger's new 32k – is being accessed, instead of the screen in bank zero.

If we wish to peek and poke any of bank zero we have to manually switch the "points" over first, which is what we'll shortly be coming to.

Figure I shows a memory map diagram of your Electron running in 64k mode which should help clear up the picture.

BBC Master 128 micros have shadow ram as standard, and the extra 12k to 31k – the BBC's Mode 7 only uses 1k of screen ram – left unused by the screen in bank zero is put to good use by the operating system as workspace for flood fill routines, ADFS workspace and so on.

The Electron, however, is unaware of the extra ram's presence and so cannot use it. Indeed, Slogger's printer buffer rom seems to be the only piece of software currently using this area.

As it happens, accessing the hidden memory is remarkably easy from both machine code and Basic. Slogger has provided a call address at &FBFD – which is central to this whole series – for just such a purpose.

It is this call which allows us control over Slogger's "railway points", and when using it we don't even have to make sure that the points are reset properly afterwards.

All this is catered for by the shadow ram controller chip – all we have to do is tell it where exactly we wish to store or retrieve the data from.

If location &FBFD is called with the X and Y registers holding the low and high bytes of an address anywhere inside the lower 32k of bank zero, then depending on the status of the 6502's overflow flag on entry, a byte may be either read from or stored in bank zero via the A register.

If the overflow flag is clear, a byte will be read from bank zero and returned in A, otherwise the contents of A are written to bank zero.

Although we have a possible 24k of ram to play with, we are assuming the worst possible case where Modes 0, 1 or 2 are being used.

So to avoid corrupting any part of a Mode 0, 1 or 2 screen – held in &3000-&7FFF – we are only going to exploit the lower 12k of bank zero, from &0000 to &2FFF.

Listing I is a shortish program – made deliberately longer than strictly necessary for clarity – which repeatedly prompts you for a sentence, and pokes it byte by byte into bank zero's lower 12k. It then retrieves and prints the sentence again.

```
10 REM Shadow ram text
20 REM store & retrieve
30 REM By Chris Nixon
40 REM (c) Electron User
50 MODE 6
60 PROCassemble
70 REPEAT
80 INPUT LINE A$
90 PROCstore
100 A$=""
110 PROCretrieve
120 PRINTA$
130 UNTILB
140
150 DEFPROCstore
160 ramX=0
170 A$=A$+CHR$(13)
180 FOR LX=1 TO LENA$
190 AX=ASC(MID$(A$,LX,1))
200 XX=ramX MOD 256
210 YX=ramX DIV 256
220 CALLput
230 ramX=ramX+1
240 NEXT
250 ENDPROC
260
270 DEFPROCretrieve
280 ramX=0
290 REPEAT
300 XX=ramX MOD 256
310 YX=ramX DIV 256
320 AX=USR(get)AND &FF
330 IF AX<>13 A$=A$+CHR$AX
340 ramX=ramX+1
350 UNTILAX=13
360 ENDPROC
370
380 DEFPROCassemble
390 FORpass%=0TO2STEP2
400 P%=&900
410 [OPT pass%
420 .put
430 PHA
440 LDA #&40
450 PHA
460 PLP
470 PLA
480 JMP &FBFD
490 .get
500 LDA #0
510 PHA
520 PLP
530 JMP &FBFD
540 ]
550 NEXT
560 ENDPROC
```

Program I

Although not a utility of any actual use in itself, it illustrates that all I have said so far is indeed true – and also provides you with the skeleton of a working program which can be adapted for many other purposes.

Note the use of a small amount of assembly language, needed in order to set or clear the status register's overflow flag before any shadow ram access. Unfortunately this is the only bit that we can't do from Basic.

The two machine code subroutines *put* and *get* use a quick and simple method of changing the overflow flag – which, by the way, is used to indicate if a machine code addition or subtraction resulted in an overflow.

We don't need to perform any additions or subtractions to alter the flag's state, however. This particular flag is bit six of the status register, and its state can be changed by loading register A with a byte whose sixth bit is either set or clear, and pushing A on the stack.

Next the stack is pulled, not back into register A, but into the status register P instead thereby forcing an immediate change in the overflow flag.

Load A with a value of 0 when reading, and when storing bytes set A to &40, before performing the stack swap into the status register.

Finally, all listings printed in this series will only work if your Electron is in 64k mode with Basic running in shadow ram. You cannot work it the other way around, and access the shadow ram from bank zero.

● *Now that you've had a taste of accessing the unused 12k, we'll continue next month with a powerful text storage utility.*

MICRO MESSAGES

Buy a Beeb? No thanks!

I HAVE an Electron system consisting of a Slogger 64k Master Ram Board, a Plus 1, colour monitor and the ACP AP4 disc drive system. I am interested in adding a music synthesiser and keyboard, and would like to enter the field of communications.

Since ACP will shortly be filling the first gap with the Music 5000 synthesiser, I have turned my attention to communications and my investigations have led me to the following conclusions.

Prestel appears to use Mode 7, and therefore I need a Mode 7 adapter. This is no problem as I can use the Jaffa Systems model.

There appears to be no shortage of modems, but they all seem to require a different interface. The Dataphone needs an RS423, the Miracle WS2000 seems to use the user port while the Watford Apollo seems to connect to the 1MHz bus.

I also appear to need software in the form of a rom, that is, Commstar.

I feel that what we need is an article on the whole communications scene, directed towards the Electron.

This should certainly be of interest to Electron users everywhere.

One remark from Watford Electronics left me gasping. They insisted that I was wasting my time with the Electron and add-ons, and that I should sell up and buy a second-hand BBC Micro.

I should like to state that the Electron, together with products from the likes of ACP and Slogger, give my family and myself hours of pleasure – long may these firms prosper.

The Electron is to the computer industry as the Mini is to the car industry. – **Michael Allison, Addlestone, Surrey.**

● We're pleased to see you're not swayed by such talk. No one has any right to dismiss the Electron offhand, especially when such a wealth of powerful upgrades can be bought at relatively low prices.

Slogger is offering a budget comms package for £85, which includes an RS423 interface, Commstar software and modem – everything you need to get on line to MicroLink, Telecom Gold, Prestel and Micronet.

We hope to run a feature on the ins and outs of communications and a review of this comms package in the near future.

Multiple printouts

I AM the proud owner of an Electron, and I have had a Plus 1, View rom cartridge and a DMP 2000 printer for a few years now.

Although I think I know View like the back of my hand, I obviously don't, because there is one option I haven't yet found in View which a lot of other word processors have.

Each week I type out one A4 side of text and print about 100 copies, and I find it extremely boring having to sit in front of my computer and monotonously type PRINT after each copy has finished.

There must be some way of telling the computer how many copies of the text I want printed.

I have tried a number of different methods, all of which have failed miserably because anything you type in after the PRINT statement is taken to mean a filename and View starts searching the tape.

I do hope you can spare me yet more boring hours sat in front of my text-filled monitor. – **Christopher Jackson, Harrogate, North Yorkshire.**

● Strangely enough, Acornsoft never provided View with a facility for printing multiple copies. The closest it came was allowing several filenames separated by commas to be placed after the Print command, which told View to fetch each file in turn and print it.

However, there is only enough room for a dozen filenames to be specified on the command mode line.

Alternatively you can press P and Return together about 16 times in succession, but this is a far cry from 100 copies.

The following listing creates a machine code file on

Turn to Page 48 ▶

No-go catherine wheel

I WISH to inform you of a faulty disc I received from you. It was the January 1988 Electron User *program disc, and the problem is that the 10 Liner, Catherine Wheel, has a missing line – there's only nine!*

After I typed in the line as printed in the magazine, and having gone over the program several times, I have still failed to get it to work. – **Mr A. Ross, Dudley, West Midlands.**

● Thank you for bringing our attention to this problem. Line 60 is indeed missing from the Catherine Wheel program on our master disc, and as it is the part responsible for creating the picture then the program won't work.

The listing as printed in the magazine is correct though – we typed it in to make sure.

However, not only has the master disc now been fixed, we also have an enhancement to the program which smooths out the spinning spokes considerably. Simply replace line 70 with this one:

```
 70 FORSX=500TO2@STEP-4@:P
ROCcircle(644,511,SX):NEXT:R
EPEAT:FOR XX=1 TO 15:VDU 19,
XX,7;0;0;:IF XX=1 VDU19,15,0
,0,0,0:NEXT:UNTIL@ ELSE VDU
19,XX-1,0,0,0,0:NEXT:UNTIL @
```

If, after entering line 60 from the magazine, you still can't get it to work, you must have made a typing error somewhere. Please check it carefully.

◀ From Page 47

disc or tape which, when *RUN, will print up to 256 copies of the text currently in memory.

It works by putting P and Return in the keyboard buffer for you as many times as specified, but it checks to see if the buffer is full first, so that no print commands are lost.

```
  10 REM Multiple Copies
  20 MODE6:FORpX=0TO2STEP2
  30 P%=&900:COPT pX
  40 LDA#p MOD256:STA &220
  50 LDA#p DIV256:STA &221
  60 LDA #14:LDX #4:LDY #0
  70 JMP &FFF4
  80 .p
  90 PHP:PHA:TXA:PHA:TYA
 100 PHA:LDX#255:LDY#255
 110 LDA#128:JSR &FFF4
 120 CPX#0:BNE exit:LDA#138
 130 LDX#0:LDY#ASC"P"
 140 JSR &FFF4:LDA#138
 150 LDX#0:LDY#13:JSR &FFF4
 160 DEC num:BPL exit
 170 LDA#13:LDX#4:LDY#0
 180 JSR &FFF4
 190 .exit
 200 PLA:TAY:PLA:TAX:PLA
 210 PLP:RTS
 220 .num:EQU8100:?3:NEXT
 230 OSCLI"SA.COPIES 900 "+
STR$~P%
```

Simply replace the 100 after the EQUB in line 220 with the number of copies you would like. Save the program, run it and enter View. Then load your text and type *COPIES, and no more supervision should be necessary.

Ram home the facts

I HAVE recently bought the Advanced Sideways Ram from ACP, and excellent it is too. I don't yet anticipate writing any roms myself, although I now fully understand the rom format.

Maybe a good idea would be for Electron User *to include more articles and information about sideways rom and ram – the February 1986 back issue was well worth buying for an article on how to make the most of sideways ram.*

I have also found that some BBC Micro and Master roms work on the Electron with ASR fitted. I have only tried those on the Master Compact welcome disc and a few from a BBC Micro, but Compact Logo works perfectly.

I don't know how to use the Sprite rom, but I suspect it uses shadow ram. Other BBC Micro roms just crash outright. Here are a few I have tried that work perfectly: Logotron Logo, Edword, ADI, ADT, Addcomm, BBC Monitor 1.92, and Help II.

Some of these use Mode 7 and therefore can produce some strange effects, but function correctly nevertheless. I am also pretty sure that BCPL, Comal, Prolog, and Ultracalc 2 are also compatible.

Would it be possible for Electron User *to create a column for rom/ram users, provided you get a good enough response?*

I would also like to know whether the Acorn 1770 DFS and GXR work on an Electron. – **Paul A. Clarke, Golborne, Warrington.**

● We're not sure whether the Acorn 1770 DFS is Electron compatible or not – but as ACP produces its own version, it doesn't really matter.

Theoretically, any BBC Micro rom which uses Acorn recommended programming protocols, and doesn't assume anything about the machine it's running on – such as OS version number, allocation of ram workspace – will run quite happily on an Electron.

The trouble begins when a rom pokes or peeks fixed locations in ram to gain its information about the system, without going through the legal channels and vectors provided for this purpose.

We can't see that sideways roms and ram will ever justify their own regular column, but we will continue to run articles and features from time to time concerning new developments and techniques of sideways rom and ram usage.

GXR does not work properly on the Electron.

ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly tested.

However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Program protection

EVER since I started programming I have wanted to be able to protect my Basic programs from prying eyes. Please could you answer two questions:

How do you put a VDU 21 – disable VDU drivers – into a disc title? How do you use Osbyte 247-249 to make Break/Control+Break re-run a Basic program?

I hope you can help me with these problems, especially the second, as I have no knowledge of assembly language. – **James Timmons, Solihull, West Midlands.**

● Sometime this year we hope to publish an article all about program protection techniques. All we can say for now is that you can use *FX200,3 in a Basic program, which will disable Escape but not Breaks, but will wipe the computer's memory if Break is pressed.

Spritely characters

I HAVE only recently started reading Electron User *and I think it is excellent. I was wondering if you could possibly include a column on games programming, as I have had my Electron for about two years but still haven't been able to crack the art of creating arcade games.*

Also, could you tell me how to use more than one colour in a character defined with the VDU 23 command? I presume it can be done, as I have seen the effect used in games which I have played. – **Geoffrey Willis (11), Southbourne, Bournemouth.**

● Over the last few months *Electron User* has been running all sorts of articles for the serious games programmer, ranging from Roland Waddilove's machine code sprites series – Part 3 of which is inside this issue – to Pete Bibby's easy machine code tutorial – which started last month.

We don't often publish programs making use of multicoloured user-defined characters, as the method involved is rather slow. However, for those of you who are interested the process is as follows:

Design an ordinary eight-by-eight character on a piece of paper. Colour in the pixels however you want, and then separate the design into several individual characters, each representing a different colour, and each consisting only of pixels from the original design which are in the corresponding colour.

For instance, suppose you would like a red monster, with yellow eyes and mouth and blue pupils. Draw it on your grid, and colour in the different parts. Three colours are involved, so draw three new grids on your paper.

Now copy all of the red pixels from the main coloured grid to the same relative positions on grid one. Then copy all yellow

pixels over to grid two, and finally copy the blue pixels to grid three.

Work out the character definitions for the three separate grids, discarding your original multi-coloured design. Place these in three VDU 23 commands, and you are almost ready to print the monster.

Finally you have to place a series of control codes into a string, to achieve the effect of overlaying all three parts in their different colours.

To do this each part of the character is printed, followed by a backspace and colour change before printing the next part.

You have to link the text and graphic cursors, and print your sprites at pixel coordinates to achieve the character overlay effect.

Try the following demonstration. Bear in mind that Mode 5 will of course be a lot faster, but limits you to only four colours.

```
  10 REM Basic Sprites
  20  MODE2:PROCdefine
  30 VDU23;8202;0;0;0;
  40 FORX%=32T0991 STEP64
  50 FORX%=0TO1279 STEP128
  60 PROCsprite(X%,Y%)
  70 NEXT:NEXT:END
  80 DEFPROCdefine
  90 VDU23,224,28,62,127,73
,73,127,65,127,23,225,0,0,0,
54,34,0,62,0,23,226,0,0,0,0,
20,0,0,0
 100 FORL%=1TO14:READB%
 110 A$=A$+CHR$(B%):NEXT
 120 ENDPROC
 130 DEFPROCsprite(X%,Y%):M
OVEX%,Y%
 140 VDU5:PRINTA$:VDU4:ENDP
ROC
 150 DATA 18,0,1,224,8,18,0
,3,225,8,18,0,4,226
```

Saving chess games

I HAVE now subscribed to your magazine for two years and find it excellent and very informative. I often type in your listings and enjoy getting them to work.

I have ordered a Slogger disc drive system, and I wondered if you had any plans to produce your monthly programs on 5.25in discs.

Also, could you or any of your readers help me with a problem I have with the Acornsoft Chess program? When trying to load a game I have previously saved, I get the message Error – file too long.

I have tried every conceivable length of name, different punctuation, quotes, full stops and so on, all to no avail. This is quite a problem as chess is often too lengthy a game to complete in one session.

I have tried more than one copy of the program, and all my other software with save and load facilities works perfectly well. – **Mr A.J. Allison, Leiston, Suffolk.**

● You don't mention what sort of set-up you have. Although we are not familiar with Acornsoft's chess, it is possible that another rom in your machine – perhaps the Plus 1 rom – is causing the problem by clashing with the program.

Another possibility is that you have a rom which sets PAGE higher than &E00, so check this out.

For the time being, try the Plus 1 disabler pokes given in answer to Andrew Cossar's problem elsewhere in this month's Micro Messages, and try the chess program again.

As to the possibility of producing 5.25in monthly discs, as always this lies with the readers. If we find that there is a sufficient demand we will review the current distribution methods.

REMOTE CONTROL PROBLEM

BEING retired, I have a lot of time to spare and have just spent the last two weeks on the Label Printer utility from the October 1987 issue of Electron User.

I know that my typing is correct because I have checked it over and over, and my wife has done the same.

I saved the program on tape, and I then created an address file in View of 20 entries which I also saved on tape.

The program runs properly until I try and load the addresses back in. Four addresses are read in OK, but no more than that.

All I get after the first four is the message Block? at line 1510, *and try as I may it refuses to work properly thereafter.*

You had a letter from a Mr. P. Eisler recently who was having similar problems. You said in your reply to him that it was important to keep the letters in the correct case, but what is the correct case?

I even created a file using the sample addresses printed alongside the program listing, with the same results.

As the listing was incomplete in the first place, I am let to wonder whether this is still the case. I am very frustrated about the whole thing. – **W.J. Leeson, Marus Bridge, Wigan.**

● We have received half a dozen letters mentioning exactly the same problem with Label Printer.

Upon investigation, the reason why sometimes no more than four addresses will load from tape has been found to be caused by not having a remote control facility on the tape recorder. (The accompanying article does stress that this is necessary).

We reconstructed exactly the same symptoms by simply unplugging the remote control wire from our recorder, and as soon as it was plugged in again the problem disappeared.

This is because Label Printer has to stop and process each block of the file after loading it, and so the tape must be paused until the program is ready to read the next chunk.

Failing to pause the tape means that by the time Label Printer is ready again it has missed the vital block header information for the next part of the View file, hence the *Block?* message.

Less machine code please

I AM writing to your excellent magazine in the hope that you can answer a question or two for me. A short while ago I bought a cassette version of the Lisp language. Could you please tell me where I can obtain a copy of the manual Lisp on the BBC Micro?

I am also interested in Slogger's Rombox Plus, and I was wondering whether it has a port for future expansion.

Do you have any pokes for Stryker's Run? I ordered the game on cassette and found it very enjoyable, but I wish that Commander Stryker had a few more lives.

Electron User *is superb and a great source of information, but could you please publish more programs which have less machine code in them, as this is quite hard to copy? Keep up the good work.* – **Kenneth Macleod, Clackmannanshire, Scotland.**

● We have a responsibility to our readers to always publish programs of the highest possible quality, and more often than not they require at least a smattering of machine code to keep the performance high.

While we would never belittle 100 per cent Basic programs, there is no denying that machine code is especially useful in games, where it can speed up the action by a factor of anything from 50 to 200 times.

Also, a lot of special effects are possible from machine code that Basic is not capable of reproducing.

We feel that the content of *Electron User* maintains a pretty fair balance between Basic and machine code, and as our readership acquires more and more expertise we think you'll find much more demand for

Turn to Page 50 ▶

◀ From Page 49

programs written – at least in part – in this potentially more fascinating language.

You can obtain a copy of Lisp on the BBC Micro from Watford Electronics, Jessa House, 250 Lower High Street, Watford. The price is £7.95 plus £1 P&P.

Turbo mode trouble

I bought a Slogger Master Ram Board upgrade at Christmas, but when I first tried playing some games in Turbo mode, a number of unusual things happened.

While playing Repton 3, after a few games boulders started appearing in mid-air and walls were replaced by the man figure.

On level eight of Chuckie Egg, platforms appeared and disappeared from their normal positions. In both Bandits At 3 O'clock and Beach Head, you could have only one or two normal games before the program started running each game for only a second or so before returning to the options page.

I would be grateful if you could tell me whether you have experienced similar problems and, if so, how you managed to solve them.

By the way, when I try to deactivate the Plus 1 and chain a game, the computer sometimes prints:

£GET$REPEATPAGEPTR#L
INEPROCORREADEVAL

Do you know of a new code for switching off the Plus 1? – **Andrew Cossar, Houston, Renfrewshire.**

● We can only suggest that you take the casing off your Electron and examine the seating of the Master Ram board carefully. If in doubt, you must send the Electron back to Slogger, explaining the symptoms as accurately as possible.

To disable your Plus 1 completely, enter:

```
*FX 163,128,1
?&212=&D6
?&213=&F1
?&2AC=0
```

Sound expansion

ONE of your headlines in January's issue stated that Slogger and Project Expansions had come together to create the new Sound Expansion Cartridge. As the sole designer of this product, I feel that I should point out that your information is incorrect.

Slogger has indeed teamed up with Project Expansions to market this and other products, but had absolutely nothing to do with its design or production as incorrectly stated in your article. – **David Ingleby-Oddy, Truro, Cornwall.**

Online astronomy

I WOULD be grateful if you could draw your readers' attention to the details here, which I am sure will be welcome to all computer comms users:

Prometheus Viewdata, Britain's first bulletin board for amateur astronomers, is now operational.

It features an online database, science fiction stories, monthly skytreck, satellite section, radio astronomy, cosmochitchat, astrosoftware, club news, comms board, downloadable software and more.

All callers are welcome, so why not logon and browse around? – **Sysop (01-300-7177)**

Puzzling pokes

IN the arcade corner section of January's issue of Electron User *there is a routine for cheating in Bug-Byte's Plan B. How do you enter this routine – before or after loading the game? – Very confused, BFPO 25.*

● This letter is typical of many we have received over the past months from people who are confused by the method used to enter the pokes given in Arcade Corner.

Every poke and command associated with a particular cheat should be entered direct from the keyboard in the order given.

The only exception to this is where you are told to change a particular line or lines in part of the game or loader.

Cheats shouldn't present readers with any further confusion once this is understood.

In the case of the Plan B cheat, however, we can see what you mean.

It does look rather ambiguous, but to use it just enter and run the cheat and then CHAIN the game as normal.

On the wrong trail

I AM having some problems with character animation in Basic programs. I am trying to move a character around the screen using pixel coordinates without leaving a trail, so far without success. Having finally torn my hair out, here is an example of my latest attempt:

```
   10 MODE1
   20 VDU 23,250,255,255,255
,255,255,255,255,255:VDU5:X=
100:Y=500
   30 MOVEX,Y:VDU250
   40 A$=INKEY$(100):IF A$="
" X=X-4
   50 IF A$="X" X=X+4
   60 IF A$=";" Y=Y+4
   70 IF A$="/" Y=Y-4
   80 GOTO 30
```

As you can see if you try it, it just doesn't work. And could you show me how to register the pressing of the Return and Shift keys? – **Andrew Tomlinson, Morpeth, Northumberland.**

● We can see your problem. In the first place, you are not attempting to wipe the character before moving it to the new location. And even if you were, the VDU5 at line 10 would prevent you using a space character as a rubber.

What you need is a different approach altogether. There are several aspects of your program that can be enhanced, the first being the keyboard input.

You are using INKEY$, which works perfectly well except that your character's speed is defined by the current keyboard delay and repeat rates, as set by *FX11 and *FX12.

Replace these statements with:

```
IF INKEY(-n) THEN ...
```

where *-n* is the negative inkey number of the key you want to test. The manual will be able to tell you the negative inkey numbers.

This way the keyboard is tested instantly and your character's speed is dictated only by the speed at which the rest of your program executes.

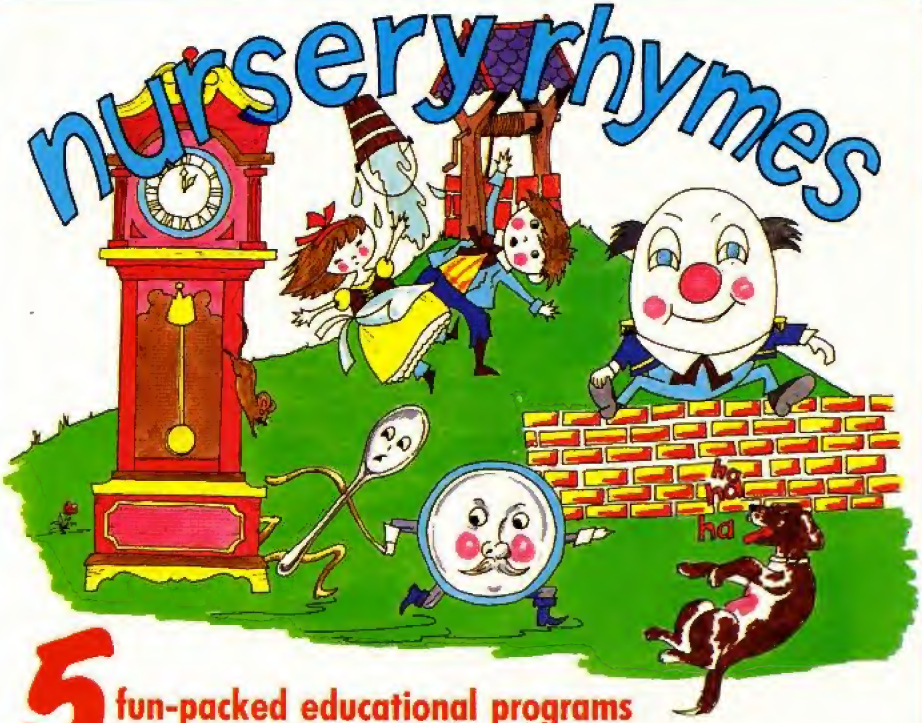
Next, we must tackle erasing your character from the screen. Fortunately, the first parameter of the GCOL command will furnish the means to do this.

If set to 3, as in GCOL 3,1 then all graphics – including text linked to the graphics cursor – will be erased if printed twice at the same position. Realising this, and after adding a copy of the X and Y coordinates for tidier erasing, we end up with:

```
   10 MODE1:VDU23,250,60,126
,219,255,102,60,66,129:VDU5:
X%=640:Y%=512:GCOL3,2
   20 MOVEX%,Y%:VDU250
   30 REPEAT:X1%=X%:Y1%=Y%:F
%=0
   40 IF INKEY(-98) F%=1:X%=
X%-4
   50 IF INKEY(-67) F%=1:X%=
X%+4
   60 IF INKEY(-73) F%=1:Y%=
Y%+4
   70 IF INKEY(-105) F%=1:Y%
=Y%-4
   80 IF F%=1 MOVEX1%,Y1%:VD
U250:MOVE X%,Y%:VDU250
   90 UNTIL0
```

To detect the Return and Shift keys, use INKEY(-74) and INKEY(-1) respectively.

nursery rhymes



5 fun-packed educational programs . . . for young children everywhere

This delightful collection of programs is based around children's favourite Nursery Rhymes. There's plenty of sparkling colour, sound and captivating animation to keep them riveted – and as they play they'll be learning all the way.

- ★ Tell the time with Hickory Dickory Dock.
- ★ Assemble the jigsaw in Humpty Dumpty.
- ★ Learn to spell with Jack and Jill.
- ★ Match the animals in See Saw Marjory Daw.
- ★ Play an exciting game in Hey Diddle Diddle.

Children from two to nine will be entertained for hours with these interactive programs. Don't miss out on this beautiful gift for your family – and at a very special price.

ONLY £5.95 (cassette)
£6.95 (3½" disc)
Suitable for any Acorn Electron

TO ORDER PLEASE USE THE FORM ON PAGE 53

3 TANTALISING TITLES FOR YOUR ACORN ELECTRON!

Computer Hits 10 Vol. 4

SAVE UP TO **£6!**

Some of the very best games for the Electron have been crammed onto two cassettes – and they're guaranteed to keep you entertained for months!

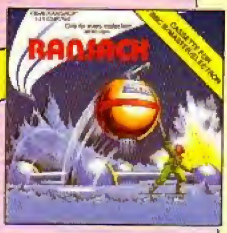
There's Repton, Thrust and Deathstar from Superior Software, Killer Gorilla, The Mine and Ghouls from Micro Power, Psycastria and Bug Eyes 2 from Audiogenic, Zalaga from Aardvark and Blagger from Alligata.

PLUS two extra games: Superior's Galaforce and Karate Combat – making a grand total of 12 different games.

This is a compilation that's not to be missed!

Ransack

SAVE UP TO **£6!**



Control AI, the globular droid, in a revenge mission against the eight rebellious planets of the Ryvian system. Ransack, the latest game from top programmer Peter Scott, is a high-speed arcade game that will tax your skill and reactions to the limit!

"This is one for every collection"
– *Guilder*, Electron User, *January 1987*

Life of Repton

SAVE UP TO **£4!**

Here's an exciting new collection of screens for you to try and crack! Start out as a baby and work your way through the five different life stages, from infancy to old age – a total of 40 new mazes with a dazzling range of graphics. It's just what you've been waiting for! And the Repton 3 main program is included with every copy.

"If you're a fan, that alone should be enough for you to go out and buy a copy...Sound 10, Graphics 10 Playability 9, Value for Money 10 Overall 9."
– *Ian Waugh*, Electron User, *January 1988*.

Please note: If you are a subscriber, you can renew your subscription early to take advantage of these very special offers.

Suitable for	Product	Format	RRP	Special reader offer	YOU SAVE	Offer including subscription	YOU SAVE
Electron	Computer Hits 10 Vol. 4	Tape	£9.95	£6.95	£3	£18.95	£6
Electron	Ransack	Tape	£9.95	£6.95	£3	£18.95	£6
Electron	Life of Repton	Tape	£6.95	£5.45	£1.50	£17.95	£4
Electron	Life of Repton	5¼ Disc	£7.95	£5.95	£2	£18.95	£4

TO ORDER TURN TO THE FORM ON PAGE 53

MAIL ORDER OFFERS

ORDER FORM

★ Special price if accompanied by subscription or renewal

All prices include postage, packing and VAT
Overseas orders sent exclusively by Air Mail

Valid to April 30, 1988
Please enter number required in box

Electron User subscription

£p

UK £15 3001
Europe & Eire £23 3003
Overseas £38 3004

Commence with _____ issue

Renewal

UK £15 *3002*
Europe & Eire £23 *3476*
Overseas £38 *3477*

Computer Hits 4 *(see page 52)* NEW

Cassette only ★ £3.95 £6.95 *3032/3033*

Ransack *(see page 52)* NEW

Cassette only ★ £3.95 £6.95 *3038/3039*

The Life Of Repton *(see page 52)* NEW

Cassette ★ £2.95 £5.45 3034/3035
5.25" Disc ★ £3.95 £5.95 3036/3037

Skirmish *(see page 28)* NEW

Cassette only ★ £4.95 £7.95 *3040/3041*

Electron User back issues

£1.75 UK
£2.75 Europe
£3.75 Overseas

January 1987 *3210*
February 1987 *3211*
March 1987 *3212*
April 1987 *3213*
May 1987 *3214*
June 1987 *3215*
July 1987 *3216*
August 1987 *3217*
September 1987 *3218*
October 1987 *3219*
November 1987 *3220*
December 1987 *3221*
January 1988 *3222*
February 1988 *3223*
March 1988 *3224*

Cassette tape annual subscription

UK £35 *3005*
Europe/Overseas £45

Commence with _____ issue

Renewal

UK £35 *3006*
Europe/Overseas £45

Electron User tapes/discs

Tape £3.95, Discs £4.75. Add £1 for Europe/Overseas

		Tape	3.5" Disc
Grid Warrior	Jan 1987	*3310*	*3410*
Maze	Feb 1987	*3311*	*3411*
Super Boss	Mar1987	*3312*	*3412*
Dragons Doom	Apr 1987	*3313*	*3413*
Hectic Henry	May 1987	*3314*	*3414*
Hungry Harry	June 1987	*3315*	*3415*
Mazebugs	July 1987	*3316*	*3416*
Arena	Aug 1987	*3317*	*3417*
Mr Miner	Sept 1987	*3318*	*3418*
Witchcraft	Oct 1987	*3319*	*3419*
Fawkes' Run	Nov 1987	*3320*	*3420*
Santa on the Tiles	Dec 1987	*3321*	*3421*
Cosmic Guerrillas	Jan 1988	*3322*	*3422*
Super Digga	Feb 1988	*3323*	*3423*
Shove Penny	Mar 1988	*3324*	*3424*
Go-Pig	Apr 1988	*3325*	*3425*

Readers in Europe (inc Eire) add £2. Overseas add £5 per item unless otherwise indicated

The Sound Master

SPECIAL OFFER

£9.99 *3000*

Add £2 for Europe (inc. Eire)/£7 for Overseas

Arcade Game Creator *(see page 20)* NEW

Tape £3.95 *3118*
3.5" Disc £4.95 *3127*
5.25" Disc £4.95 *3010*

Knitwear Designer

Tape £8.95 *3128*
5.25" Disc £9.95 *3129*

Add £2 for Europe (inc Eire); £5 for Overseas

Nursery Rhymes *(see page 51)*

Tape £5.95 | 3.5" Disc £6.95

3018/3019

Add £1 for Europe/Overseas

Education Special Vol. 2

Classroom Computing on the Electron

Magazine + Electron Cassette £3.95 *3007*
Magazine + Electron 3.5" Disc £4.95 *3008*

Add £2 for Europe (inc Eire); £4 for Overseas

Fun School *(see page 44)*

	Tape £6.95	3.5" Disc £5.95
Ages 2-5 *3080/3108*		
Ages 5-8 *3081/3109*		
Ages 8-12 *3082/3110*		

Add £1 for Europe/Overseas

Getting Started In BBC Basic

£2.95 *3100*

Advanced User Guide

£3.45 *3072*

Mini Office *(see page 19)*

Tape £5.95 *3062*

Add £1 for Europe/Overseas

Magic Sword

Tape £5.95 | 3.5" Disc £6.95

3065/3105

Add £2 for Europe (inc Eire); £5 for Overseas

Ten of the Best

	Tape £5.95	3.5" Disc £6.95
Volume 1 *3068/3111*		
Volume 2 *3069/3112*		
Volume 3 *3070/3113*		
Volume 4 *3120/3121*		

Add £1 for Europe/Overseas

French on the Run

Tape £9.95 *3115*

Add £1 for Europe/Overseas

Classic Card and Board Games

No. 1 Tape £5.95 *3090*
3.5" Disc £7.95 *3092*
No. 2 Tape £5.95 *3091*
3.5" Disc £7.95 *3093*

Add £1 for Europe/Overseas

Electron Dust cover

£3.95 *3058*

Add £1 for Europe/Overseas

Magazine Binder

£3.95 *3059*

Add £3 for Europe (inc Eire); £7 for Overseas

TOTAL

Send to: Database Publications, FREEPOST, Europa House, Adlington Park, Adlington, Macclesfield, Cheshire SK10 4NP

(No stamp needed if posted in UK) Please allow 28 days for delivery

Order at any time of the day or night

Fax Orders:	*Orders by Prestel:*	*MicroLink/Telecom Gold*
0625 879966	Key *89, then 614568383	72:MAG001

Telephone Orders: 0625 879920

Don't forget to give your name, address and credit card number

ENQUIRIES ONLY: 0625 879940 9am-5pm

Payment: please indicate method (✓)

Expiry Date ___/___

☐ Access/Mastercard/Eurocard/Barclaycard/Visa

No. _____

☐ Cheque/Eurocheque made payable to Database Publications Ltd.

Name _____ Signed _____

Address _____

_____ Post Code _____

Tel _____

ELU4

Have you written a program good enough to sell?

If so we would like to hear from you. Database Software is looking for good quality software – games, utilities, business programs. If you think you have a winner send it for evaluation (on disc or tape, plus instructions and a brief outline) to:

The Manager
Database Software
Adlington Park
Adlington
Macclesfield SK10 5NP

ELECTRON GAMES
FROM ONLY
99p

Send S.A.E. for a full list to –
ALLEN JAMES COMPUTERS,
831 STRATFORD ROAD, SPARKHILL,
BIRMINGHAM B11 4DA

AN EXCITING WORLD OF LEGEND, WITCHCRAFT AND DEMONS

3·95

another great game from

LARSOFT
ADVENTURE GAMES
4 Chantry Road,
Clifton, Bristol BS8 2QD

LIGHTSPEED SOFTWARE
Dept EU
31A BROADWEIR BRISTOL BS1 TELEPHONE: 0272-225604

24 HOUR ANSWER PHONE FOR ALL QUERIES
New titles available on release day

TITLE	OUR PRICE	TITLE	OUR PRICE
ADVENTURE CREATOR	12.50	PALACE OF MAGIC (5.25" disc)	10.80
BONECRUNCHER	7.75	PALACE OF MAGIC (3.5" disc)	12.50
COMPUTER HIT 10 V3	7.75	PHANTOM COMBAT	3.50
COMPUTER HIT 8	6.90	PSYCLASTRON	6.90
CRAZEE RIDER	7.75	RAVENSKULL	7.75
ELITE	10.50	REPTON 3	7.75
ELIXIR	7.75	ROUND WORLD 80 SCRN	6.75
IMPACT	7.75	SKIRMISH	7.50
KOURTYARD	7.50	STAR WARS	7.75
MINI OFFICE	4.90	SUPEROR COL VOL 3	7.75
PALACE OF MAGIC	7.00		

ALL PRICES ARE INCLUSIVE OF VAT AND DELIVERY INSIDE THE UK.
PLEASE MAKE CHEQUES P.O.s PAYABLE TO
"LIGHTSPEED SOFTWARE"
ALL ORDERS DESPATCHED WITHIN 24 HOURS, BUT PLEASE ALLOW 7 DAYS

"This must be the best adventure ever for the Electron"
ELECTRON USER – MAY 1987

EPIC ADVENTURES
THE LOST CRYSTAL

A full-scale GRAPHIC adventure with 400 locations

The Rainbow Crystal, which has protected the people of Zaloria for many years, has been shattered into seven pieces by a mysterious bolt of lightning. Your task is to seek out the missing pieces and find a way to re-create the magical Rainbow Crystal.

Each game contains:
2 Cassettes, Instruction Book and Help Book

£11.95 Plus 70p Post & Packaging

- 400 locations, each one depicted in colourful high-resolution graphics
- Graphics and text are displayed at the same time; no need to switch between text and graphic screens
- Intelligent moving characters with whom you may communicate and interact
- Advanced language and speech interpreters capable of accepting complex commands in plain English
- Fast position-save to tape or memory
- No frustrating mazes or illogical puzzles

Also available: Our popular Text Adventures

THE WHEEL OF FORTUNE.. £5.95 You are transported to a fantasy world of magic and mystery. As you wander this mystical land you encounter some strange people. They may help you to find valuable treasures but don't upset them or you may not live to find the Wheel of Fortune and return to civilisation.
Voted top adventure by Electron User readers.

THE QUEST FOR THE HOLY GRAIL..£4.95 To become a Knight of the Round Table, you must find the Holy Grail and return it to Camelot. Sounds simple, but you will have to face the deadly Black Knight, befriend the beautiful maiden, summon the mystical monk and solve a host of other problems to complete your quest.

CASTLE FRANKENSTEIN.. £4.95 The monster is terrorising the villagers. Frankenstein has been elected to seek out and destroy him, but where do you start? Perhaps the graveyard holds some clues, or the deserted shack? Once you enter Frankenstein's castle, your adventure has only just begun.

THE KINGDOM OF KLEIN. £4.95 The Wicked Witch of the Mountain has stolen the magic Klein Bottle from the palace. She has sworn to put a hideous curse on whoever tries to recover it. Can you discover the mystical properties of the Bottle and destroy the witch? Can you then escape from her domain alive?

ORDER FORM. Send to *EPIC SOFTWARE*, Dept. E, 10 Gladstone Street, Kibworth Beauchamp, Leicester LE8 0HL

Please send me .....

I enclose cheque/PO for £ ..... (please add 70p P&P) made payable to Epic Software

NAME .....

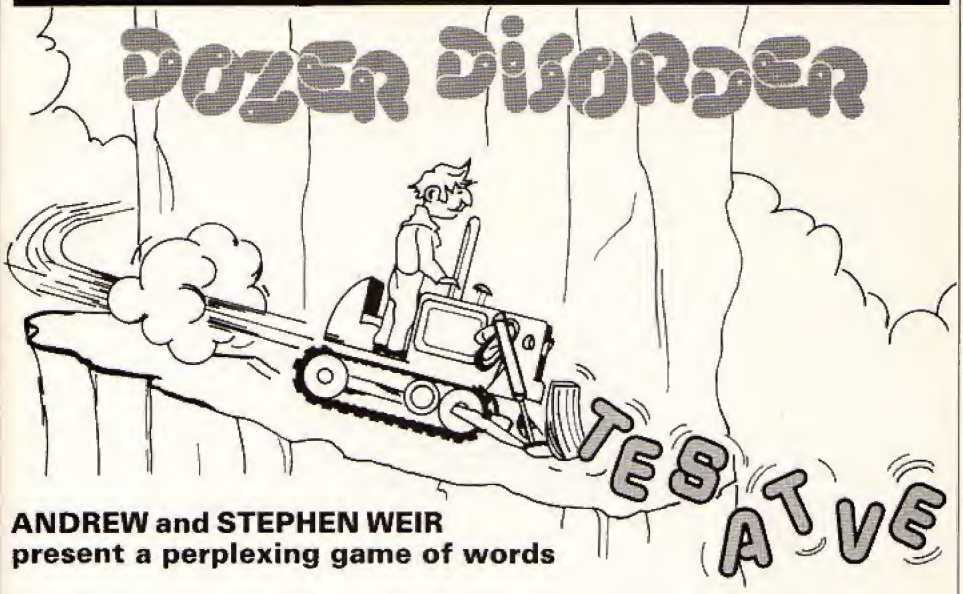
ADDRESS .....

..... POST CODE .....

All orders despatched within 24hrs. *Send letter if you don't want to cut magazine*

You can also order our games from your local POST OFFICE by asking for a TRANSCASH form and quoting our National Girobank number 45-306-4000

Dozer Disorder



ANDREW and STEPHEN WEIR present a perplexing game of words

DOZER Disorder is an exceptional word puzzle with superb graphics for children from six to sixty, designed to improve your mental agility with words.

Bill, the bulldozer driver works on a very unusual building site where dictionaries, rather than houses are made. You have applied to the site for a job as the new builder. To prove you are good enough though, you must first sit a complex anagram test.

Using his special bulldozer, Bill is pushing words with their letters all jumbled up into a deep pit. To complete the test, you must unscramble the letters, and give the correct word back to him.

When you have the answer, simply type in the word and press the spacebar. If you make a mistake while typing in the word, press Delete. If the word is wrong, Bill will push all the letters back into the pit and you will have to try again.

He will give you three tries at each word before revealing the answer. If this happens, you will have to start all over again. Don't spend to long thinking though, because he will soon get tired of waiting and after about half a minute you will lose a turn.

You must unscramble five words on each level and there are seven levels in all, so you will have to unscramble a total of 35 words to get the job.

At any time during the game, the tune can be switched off or on by pressing the 1 key.

While entering and debugging the program, it is recommended that lines 80 and 90 are temporarily omitted, as they disable the editing and Escape keys.

If you wish to change the words on any level, simply change the data, for instance:

```
1470 REM Level 7
1480 DATA word1,word2,word3
word4,word5
1481 DATA word6,END
```

Each word must be typed in lower case and, memory allowing, you can have as up to 50 words on each level. The end of the data in each one must be marked by the text END, as in the example.

VARIABLES

n$	The player's name
w$	Unscrambled word
s$	Scrambled word
l%	The level of play
s%	Sound on or off

PROCEDURES

t	Plays the tune
d	Displays the bulldozer
a	Assembles the machine code
s	Prints the instructions
p	Prints the anagram

◀ From Page 55

```
   10 REM Dozer Disorder
   20 REM by Andrew and Step
hen Weir
   30 REM (c) Electron User
   40 MODE5:PROCin
   50 PROCm
   60 DEF PROCin
   70 cd=&900:PROCas:sX=-1:D
IM d1% 480,d2% 480:inX=0:*fx
11,0
   80 *fx4,1
   90 *fx229,1
  100 *fx202,48
  110 VDU23,140,192,240,248,
252,254,254,255,255,23,141,1
28,128,192,192,224,240,252,2
55,23,142,3,15,31,63,127,127
,255,255,23,143,0,0,0,0,0,0,
126,0,23,151,85,170,85,170,8
5,170,85,170
  120 VDU23,144,0,0,255,255,
255,255,0,0,23,145,224,224,2
24,224,224,224,224,224,23,14
6,7,7,7,7,7,7,7,23,147,0,0
,15,63,127,255,248,224,23,14
8,0,0,240,252,254,255,31,7,2
3,149,224,248,127,127,63,15,
0,0,23,150,7,31,255,254,252,
240,0,0
  130 DIMa$(11),pX(12),c(7),
wd$(5):RESTORE140:FORIX=1TO1
1:READpX(IX):NEXT:RESTORE150
:FORIX=1TO7:READc(IX):NEXT:E
NDPROC
  140 DATA0,1,3,2,4,6,5,7,9,
8,10,11
  150 DATA3,5,2,1,5,2,3
  160 DEF PROC((l) b=0:REPEA
T READd:1fd>=0b?l=d
  170 IFd=-1READct,d:FORo=1T
Oct:b?l=dcb=b+1:NEXT ELSEb=b
+1
  180 UNTILd=-9:ENDPROC
  190 DEF PROCd(pX,tX) lnew=
pX:IFtX=1 !place=d1% ELSE !p
lace=d2%
  200 CALLdozer:ENDPROC
  210 DEF PROCas:oswrch=&FFE
E:osword=&FFF1:new=&70:rows=
&72:columns=&73:temp1=&74:pl
ace=&76
  220 FORpass=0TO2STEP2:P%=c
d:[OPTpass
  230 .dbl STAb:LDA#10:LDX#b
AND255:LDY#b DIV256:JSRoswo
rd:LDA#0:STAj:.d1 LDA#23:JSR
oswrch:LDAj:ORA#224:JSRoswrc
h:LDAj:ASLA:ASLA:TAX:LDY#4:.
d2 INX:LD4b,X:JSRoswrch:JSRo
swrch:DEY:BNEd2:INCj:LDAj
  240 CMP#2:BNEd1:LDX#4:.d3
LDAs,X:JSRoswrch:DEX:BPLd3:R
TS
  250 .dozer LDY#0:LDAplace:
STAnewdata+1:LDAplace+1:STAn
ewdata+2:LDA#48:STArows:LDA#
10:STAcolumns:JSRloop1:RTS
  260 .loop1:LDAnew+1:STAtem
p1+1:LDAnew:STAtemp1:LDXrows
:.loop2:.newdata LDA &3000,Y
:STA(new),Y:INCnewdata+1:BNE
p3:INCnewdata+2:.p3 LDAnew:A
ND #7:CMP#7:BEQbottom2:INCne
w:BNEp4:INCnew+1:.p4 BNE nex
t2
  270 .bottom2 CLC:LDAnew:AD
C#&39:STAnew:LDAnew+1:ADC#1:
STAnew+1:.next2:DEX:BNE loop
2:LDAtemp1:ADC#8:STAnew:LDAt
emp1+1:ADC#0:STAnew+1:DECcol
umns:BNEloop1:RTS
  280 .bs:]:j=b+9:s=j+1:$s=CH
R$11+CHR$225+CHR$8+CHR$10+CH
R$224:NEXT:ENDPROC
  290 DEF PROCi(A$) FORCHX=1
TOLENA$:AX=ASCMID$(A$,CHX,1)
:CALLdb(:NEXT:ENDPROC
  300 DEF PROCg(A$) FORCHX=1
TOLENA$:IFn$=" PROCt(-10) E
LSE PROCt(-4)
  310 B$=MID$(A$,CHX):?&70=A
SC B$:AX=10:XX=&70:YX=0:CALL
&FFF1:VDU23,250,?&71,?&71,?
&71,?&71,?&72,?&72,?&72,?&72
,23,251,?&73,?&73,?&73,?&73,
?&74,?&74,?&74,?&74
  320 VDU23,252,?&75,?&75,?&
75,?&75,?&76,?&76,?&76,?&76,
23,253,?&77,?&77,?&77,?&77,?
&78,?&78,?&78,?&78:FORIX=1TO
4:VDU249+1%:IFIX<4 VDU8,10
  330 NEXT:VDU11,11,11:NEXT:
ENDPROC
  340 DEF PROCm *fx15
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
  350 RESTORE790:REPEAT VDU2
2,4:PROCins:VDU22,5:n$=FNn:l
%=0:CLS:REPEAT l%=l%+1:PROCb
:wX=0:r%=0:PROCr:FORIX=1TO5:
FORJX=1TORND(5@):READwd$(IX)
:IFLEFT$(wd$(IX),3)="END"PRO
Cr:READwd$(IX)
  360 NEXT:NEXT:RESTORE790:*
fx15
  370 cX=-1:REPEAT IFcX PROC
p
  380 cX=FNa:IFcX>=0 PROCw E
LSE PROCrt
  390 UNTILwX=3 OR r%=5:UNTI
LlX=7 OR wX=3:IFwX=3PROCla E
LSE PROCwn
  400 UNTILØ
  410 DEF PROCins VDU23;8202
;0;0;0;
  420 VDU17,129,28,0,3,39,0,
12,17,0,31,13,1:PROCi("Dozer
 Disorder"):VDU17,128,26,31,
0,6,17,1:PRINT"With his bull
dozer, Bill is pushing""wo
rds into a deep pit.  Your j
ob is to""unscramble each
word, and give it back""to
 Bill."
  430 PRINT"If the word is i
ncorrect, then Bill""will
push it down into the pit ag
ain.""You have half a minu
te to unscramble""each wor
d using the letters in the p
it.""To toggle the sound O
FF and ON, press 1."
  440 PRINT"Keys:      Delete
  - erase""            Spa
ce Bar - when finished":*fxl
5
  450 IF NOTinX inX=-1:RESTO
RE670:PROCi(d1%):RESTORE730:
PROCi(d2%)
  460 VDU17,129,28,0,31,39,2
9,12,17,0:PRINTTAB(6,1);"Pre
ss the SPACE BAR to play";:R
EPEAT key%=INKEY(1):PROCt(-1
0):IFkey%=ASC"1"sX=NOTsX:*fx
15
  470 UNTILkey%=32:ENDPROC
  480 DEF PROCb VDU19,1,6,0;
19,2,6(IX);0;17,3,31,3,0:PRO
Ci("Dozer Disorder"):VDU17,2
,31,0,3:PRINTn$;VDU17,1,31,1
3,3:PRINT"Level ":VDU17,129,
28,0,30,15,20,12,26,31,16,30
,32,32,32,32,8,11,32,8,11,32
,8,11,32,8,11,32,8,11,32,8,1
1,32
  490 VDU17,128,8,11,142,31,
15,20,148:COLOUR3:PRINTTAB(1
9,3);STR$(%:ENDPROC
  500 DEF PROCp VDU28,4,19,1
9,14,12,26:wS=wd$(rX+1)
  510 PROCma(wS):REPEAT:FORI
%=1TOLENwS-1:PROCt(-4):one%=
RND(LENwS-1)+1:two%=RND(LENw
S-1)+1:dm$=a$(one%):a$(one%)
=a$(two%):a$(two%)=dm$:NEXT:
s$=FNms:UNTILs$<>wS
  520 PROCps(s$,0,10):PROCpl
:ENDPROC
  530 DEF PROCpl COLOUR3:pl$
=LEFT$(wS,1):FORpl%=9TO11-LE
NwS STEP-1:PROCd(&6978+pl%*1
6,plXMOD2+1):VDU31,pl%-4,16,
32,8,10,32:PRINTTAB(pl%+4,18
);:pl$=pl$+CHR$143:PROCi(pl$
)
  540 PROCt(-4):NEXT:ENDPROC
  550 DEF PROCps(ps$,stX,fX)
COLOUR128:VDU28,16,29,18,22
,12,26
  560 piX=0:COLOUR3:FORps%=s
tX TO fX:addX=&6978+ps%*16:PRO
Ct(-4):PROCd(addX,psXMOD2+1)
:PRINTTAB(ps%+4,18);:PROCi(p
s$)
  570 IFps%<4+LENps$>15 PROC
fCRIGHT$(ps$,13):ps$=LEFT$(p
s$,LENps$-1)
  580 IFosX=stX AND (rX=5 OR
 wX=3) THEN forIX=1TO1@:PROC
t(-4):NEXT
  590 NEXT:ENDPROC
  600 DEF PROCf(l$) PROCt(-4
):PRINTTAB(15,18);:PROCi(" "
):IFpiX<9 PRINTTAB(16,21);:P
ROCi(l$):PRINTTAB(16,21);:PR
OCi(" ")
  610 piX=piX+1:PROCpit(piX,
l$):ENDPROC
  620 DEF PROCpit(xX,l$) PRI
NTTAB(pX(xX)MOD3+16,28-((pX(
xX)DIV3)+2));:PROCi(l$):ENDP
ROC
  630 DEF PROCma(st$) FORIX=
1TO11:PROCt(-4):IFIX<=LENst$
a$(IX)=MID$(st$,IX,1) ELSE
a$(IX)=""
  640 NEXT:ENDPROC
  650 DEF FNms st$="":FORIX=
1TO11:PROCt(-4):IF a$(IX)<>"
" st$=st$+a$(IX)
  660 NEXT:=st$
  670 REM Dozer One
  680 REM 10,48
  690 DATA -1,135,0,17,51,50
,118,50,51,17,17,0,0,1,0,2,0
,1,-1,17,0,96,96,-1,8,224,24
0,240,112,240,240,249,255,24
0,150,15,150,240,255,34,0,0,
0,4,8,0,4,0,1,-1,9,0,112,242
,230,242,230,102,82,37,91,18
0,91,164
  700 DATA 74,14,14,46,55,-1
,4,240,242,255,240,240,15,24
0,240,255,68,-1,5,0,10,4,14,
4,10,-1,14,0,16,48,116,188,1
80,188,-1,5,52,-1,4,240,244,
255,240,240,15,240,240,255,1
53,-1,7,0,4,14,14,15,17,50,4
9,50,49
  710 DATA 50,117,114,117,11
4,117,114,117,240,240,160,20
8,160,208,160,208,160,208,16
0,208,240,240,240,249,255,24
0,240,15,240,240,255,34,-1,2
0,0,16,49,50,17,240,240,176,
80,176,80,176,80,176,80,176,
80,240,24
  720 DATA 240,242,255,225,1
35,15,150,240,255,68,-1,21,0
,128,136,0,128,-1,8,192,193,
193,195,194,135,133,15,10,14
,132,15,196,204,136,136,-1,2
4,0,8,-1,12,12,-1,6,14,15,7,
7,3,3,0,-9
  730 REM Dozer Two
  740 REM 10,48
  750 DATA -1,135,0,17,51,11
8,50,50,51,17,0,0,0,5,8,2,5,
1,-1,17,0,96,96,-1,8,224,240
,240,112,240,240,244,255,240
,150,15,150,240,255,68,0,0,0
,4,8,0,5,0,1,-1,9,0,112,242,
238,242,230,102,82,37,91,180
,91,164
  760 DATA 74,14,14,46,55,-1
,4,240,249,255,240,240,15,24
0,240,255,153,-1,4,0,4,10,6,
10,12,10,-1,14,0,16,48,116,1
88,180,188,-1,5,52,-1,4,240,
242,255,240,240,15,240,240,2
55,34,-1,7,0,4,10,4,11,17,50
,49,50,49
  770 DATA 50,117,114,117,11
4,117,114,117,240,240,160,20
8,160,208,160,208,160,208,16
0,208,240,240,240,244,255,24
0,240,15,240,240,255,68,-1,2
0,0,16,49,50,17,240,240,176,
80,176,80,176,80,176,80,176,
80,240,240
  780 DATA 240,249,255,225,1
35,15,150,240,255,153,-1,21,
0,128,136,0,128,-1,8,192,193
,193,195,194,135,133,15,10,1
4,132,15,196,204,136,-1,25,0
,8,-1,12,12,-1,6,14,15,7,7,3
,3,0,-9
  790 REM Tune data
  800 DATA128,128,128,128,12
8,128,124,124,128,128,128,12
0,120,128,116,116,100,100,10
0,100,96,96,88,88,80,80,0,0,
0,0,128,128,0,0,0,0,0,0
  810 DATA128,100,116,100,12
8,100,116,100,128,100,116,10
0,136,100,116,100,128,100,11
6,100,128,100,116,100,128,10
```

```
0,116,100,136,100,116,100,12
8,100,116,100,136,100,116,10
0,144,100,116,100,148,100,11
6,100
  820 DATA144,72,120,72,136,
72,120,72,136,72,120,72,136,
72,120,72,136,72,120,72,136,
72,120,72,136,72,120,72,144,
72,120,72,136,72,120,72,136,
72,120,72,136,72,120,72,144,
72,120,72,136,72,120,72,136,
72,120,72,144,72,120,72,136,
72,120,72
  830 DATA136,100,116,100,12
8,100,116,100,128,100,116,10
0,128,100,116,100
  840 DATA128,100,116,100,12
8,100,116,100,128,100,116,10
0,136,100,116,100,128,100,11
6,100,128,100,116,100,128,10
0,116,100,136,100,116,100,12
8,100,116,100,136,100,116,10
0,144,100,116,100,148,100,11
6,100
  850 DATA144,72,120,72,136,
72,120,72,136,72,120,72,136,
72,120,72,136,72,120,72,136,
72,120,72,144,72,120,72,136,
72,120,72,128,100,116,100,12
8,100,116,100,136,100,116,10
0,128,116,100,116
  860 DATA120,72,108,96,116,
92,120,88,128,80,132,72,136,
68,144,60,148,52,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
  870 DATA-1
  880 DEF FNn VDU23;82082;0;0
;0;:PROCson
  890 VDU31,5,1,17,3:PROCg("
Dozer Disorder"):VDU31,4,9,1
7,2:PROCi("What is your"):VD
U31,7,12:PROCi("name?"):COLO
UR3:PRINTTAB(0,27)"RETURN ";
:COLOUR2:PRINT"when finished
":COLOUR3:PRINT"DELETE ";
  900 COLOUR2:PRINT"to corre
ct"        a mistake";:VDU1
7,1,31,2,19,147,31,17,19,148
,31,2,23,149,31,17,23,150,31
,2,20,145,8,18,145,8,18,145,
31,17,20,146,8,18,146,8,18,1
46:PRINTTAB(3,19);STRING$(14
,CHR$144);TAB(3,23);STRING$(
14,CHR$144);
  910 PRINTTAB(2,5);STRING$(
16,CHR$144):COLOUR3:n$="":PR
INTTAB(4,21);:*fx 15,1
  920 PROCsoff:REPEAT PROCt(
-12):key%=INKEY(0):IF (key%=
32 OR (key%>=ASC"A"ANDkey%<=
ASC"Z") OR (key%>=ASC"a"Andk
ey%<=ASC"z") OR key%=ASC"'")
 AND POS<16 VDUkey%:n$=n$+CH
R$(key%)
  930 IF key%=127 AND LENn$
n$=LEFT$(n$,LENn$-1):IF POS>
3 VDUkey%
  940 IFkey%=ASC"!"s%=NOTs%:
*fx15
  950 UNTIL key%=13:*fx 21,5
  960 IFn$="" n$="Lazy"
  970 =n$
  980 DEF PROCt(VX) IF NOTs%
VX=0
```

```
  990 READ pt%:IF pt%<0 REST
ORE790:READpt% ELSE IFpt%=0
THEN SOUND2,0,0,1 ELSE SOUND
2,VX,pt%,2
 1000 ENDPROC
 1010 DEF PROCson FORI%=1TO3
:VDU19,I%,0;0;:NEXT:ENDPROC
 1020 DEF PROCsoff VDU19,1,6
;0;0;19,2,5;0;0;19,3,7;0;0;:
ENDPROC
 1030 DEF FNa *fx21
 1040 a$=LEFT$(w$,1):PROCma(
s$):s2$=" "+MID$(s$,2,LENs$)
:fr%=0
 1050 TIME=0:REPEAT key%=INK
EY(1):PROCt(-4):IFkey%=ASC"!
"s%=NOTs%:*fx15
 1060 IF TIME MOD100>=90 fr%
=NOT fr%:PROCd(&6970+(pl%*1)
+16,fr%*2)
 1070 IF key%>=ASC"A"ANDkey%
<=ASC"Z" key%=key%+32
 1080 IF(key%>=ASC"A"ANDkey%
<=ASC"Z")OR(key%>=ASC"a"ANDk
ey%<=ASC"z")THEN PROCl%(CHR$
key%)
 1090 IFkey%=127 PROCdel
 1100 UNTIL(key%=32 AND LENw
$=LENa$) OR TIME>3000:IF TIM
E>3000 THEN a$=s$:=1 ELSE =(
a$=w$)
 1110 DEF PROCl%(l$) IF INST
R(w$,l$)=0 OR INSTR(s2$,l$)=
0 THEN ENDPROC
 1120 COLOUR1:pc%=INSTR(s2$,
l$):PROCpit(LENw$-(pc%-1),CH
R$151):s2$=LEFT$(s2$,pc%-1)+
" "+MID$(s2$,pc%+1,LENs2$)
 1130 COLOUR3:a$=a$+l$:PRINT
TAB(14-LENw$+LENa$,18);:PROC
f(l$)
 1140 ENDPRDC
 1150 DEF PROCdel a$=LEFT$(w
$,1):s2$=" "+MID$(s$,2,LENs$
):COLOUR3:PRINTTAB(16-LENw$,
18);:PROCi(STRING$(LENw$-1,C
HR$143))
 1160 pZ%=0:q2%=LENw$:REPEAT
 PROCpit(p2%+1,MID$(s$,q2%,1
)):p2%=p2%+1:q2%=q2%-1:UNTIL
q2%=1
 1170 ENDPROC
 1180 DEF PROCw IFc%=0 P$="W
rong!"ELSEP$="Time out!"
 1190 COLOUR129:COLOUR3:PRIN
TTAB(5-c%*2,24);:PROCg(P$):P
ROCps(a$,12-LENw$,11+(w%<2))
:w%=w%+1:s$=a$:COLOUR1:COLOU
R129:PRINTTAB(5-c%*2,24);:PR
OCg(P$):COLOUR128
 1200 IFw%<3 PROCpl
 1210 IFc%=1c%=0
 1220 ENDPROC
 1230 DEF PROCrt rX=r%+1:VDU
17,129,17,3,31,4,24:PROCg("C
orrect!"):COLOUR128
 1240 IFr1=5ANDl%=7 PROCps(w
$,11-LENw$,11) ELSE FORI%=11
-LENw$ TO@STEP-1:PROCd(&6970
+I%*16,I%MOD2+1):VDU31,I%+4,
16,32,8,10,32:PROCt(-4):PRIN
TTAB(I%+4,18);:COLOUR3:PROCi
(w$+" "):NEXT
 1250 VDU17,129,17,1,31,4,24
:PROCg("Correct!"):COLOUR128
:ENDPROC
 1260 DEF PROCr IF L%=1 REST
ORE 1350 ELSE IF L%=2 RESTOR
E 1370 ELSE IF L%=3 RESTORE
1390 ELSE IF L%=4 RESTORE 14
10 ELSE IF L%=5 RESTORE 1430
 ELSE IF L%=6 RESTORE 1450 E
LSE RESTORE 1470
 1270 ENDPROC
 1280 DEF PROCwn PROCmg("Wel
l done "+n$+"!"):ENDPROC
 1290 DEF PROCla PROCmg("Har
d luck "+n$+"... The word wa
s "+w$+"!"):ENDPROC
 1300 DEF PROCmg(A$) COLOUR3
:REPEAT sp%=INSTR(A$," "):B$
=LEFT$(A$,sp%-1):A$=RIGHT$(A
$,LENA$-sp%):FORI%=1@TO@STEP
-1:PROCt(-4):PROCd(&6970+I%+
16,I%MOD2+1):VDU31,I%+4,16,3
2,8,10,32,8,10,32,8,10,32,8,
10:NEXT
 1310 FORY%=6TO18:PROCt(-4):
PRINTTAB(4,Y%);:PROCi(B$):PR
INTTAB(4,Y%-1);SPC12:NEXT:PR
OCps(B$,0,11)
 1320 UNTILB$=A$:ENDPROC
 1330 DEF PROCwin ENDPROC
 1340 REM Word data
 1350 REM Level 1
 1360 DATA about,after,aroun
d,come,large,next,people,pre
tty,should,sister,summer,som
e,teacher,their,then,there,t
hink,things,through,today,wa
nt,write,here,mother,father,
who,shift,lock,END
 1370 REM Level 2
 1380 DATA across,air,aunt,a
pple,autumn,beautiful,behind
,birthday,bought,built,calli
ng,christmas,cousin,colour,d
aisy,different,dress,eating,
enough,even,family,flower,fo
rtune,happen,grandma,END
 1390 REM Level 3
 1400 DATA against,already,a
rrive,basket,beginning,bigge
st,breakfast,business,captai
n,climb,coloured,countries,c
rying,digging,doctor,fetch,e
ntries,favourite,frightened,
glass,goal,hardly,somewhere,
END
 1410 REM Level 4
 1420 DATA ahead,base,baske
tball,beside,below,branch,cap
ital,chimney,citizen,clothin
g,dental,disease,downstairs,
especially,headmaster,knock,
leader,longer,END
 1430 REM Level 5
 1440 DATA absent,aircraft,a
ssembly,blanket,bulldozer,ca
mary,contest,dangerous,dicti
onary,electricity,empty,foot
path,forgotten,garage,gift,g
overnment,hammer,health,hono
ur,husband,juice,language,la
zy,END
 1450 REM Level 6
 1460 DATA account,agreement
,apron,avenue,bathing,butter
fly,carpenter,comfortable,co
stume,disappoint,excitement,
forward,furniture,immediatel
y,lightning,machinery,planta
tion,protection,settlement,s
mooth,transport,umbrella,END
 1470 REM Level 7
 1480 DATA acquainted,backwa
rds,boundary,equipment,gradu
ally,dependence,photography,
production,shepherd,stationa
ry,stationery,throughout,int
erested,understood,variety,w
heelbarrow,whatever,width,wr
eath,zebra,zealous,tongue,tr
aveller,END
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

Counting the cost

Run a software company in Part 2 of CHRIS NIXON's series on ViewSheet

I INTRODUCED the basic principles behind using ViewSheet last month, and showed how to produce a simple spreadsheet of your own.

Now we'll see how we can use one to run a small company.

If last month's examples proved a bit too much for some of you, don't worry – a lot of the same ideas will be used and explained again here, together with one or two more interesting features of ViewSheet.

The bank statement spreadsheet from last month's issue introduced four basic concepts involved in the production of any spreadsheet – slots, labels, values and formulae.

The difference between a label and a value is simply that a label is a slot containing text – like the DATE slot in last month's sheet.

ViewSheet looks at each new entry into the sheet when you press Return, and if it cannot recognise the slot as either a number or a formula, it is assumed to be a label.

The character displayed at the top left of your editing screen is called the type flag, and indicates which type of slot the cursor is currently on.

If it is a label, a capital L will be shown. A value is indicated by a capital V, while a blank slot is denoted by a space.

Load in last month's sheet, and watch the type flag change while you move the cursor around.

With that out of the way, wipe your sheet clean by returning to command mode with the Escape key and typing NEW. We are now going to create a new sheet, using the slot references and contents shown in Listing I.

To enter Listing I correctly, start at the top of the list and move the cursor to the first slot reference shown. Type in the contents shown for that slot exactly as printed, and press Return.

Slot	Contents
A1	CLEVER
A3	PRODUCT
A4	AUTHORS
A5	ARTWORK
A6	PRODCTN
A7	RETAIL
A9	-------
A10	SALES
A12	UNITS
A13	OVERALL
A14	UNITS
A15	GROSS
A17	GROSS
A18	NET
A19	-------
B1	SOFT
B3	NAME:
B4	XRYLTY:
B5	COSTS:
B6	COST:
B7	PRICE:
B9	-------
B10	FIGURES
B12	MADE:
B13	COST:
B14	SOLD:
B15	INCOME:
B17	PROFIT:
B18	PROFIT
B19	-------
C1	LTD
C3	ALIEN
C4	15
C5	500
C6	3.95
C7	9.95
C9	-------
C10	(JAN)
C12	600
C14	350
C19	-------
D3	SHOOTUP

Listing I

Proceed down the listing in this manner until your sheet looks like Figure I.

This new, easy-to-follow format for entering complete spreadsheets has been adopted for the remainder of this series, and will also be used in future whenever a spreadsheet is published in *Electron User*.

You should now have on your screen a copy of Clever Soft's production cost calculator spreadsheet, with only a few figures entered so far.

During the series we shall watch Clever Soft develop its sheet more and more to accommodate the company's growing success.

First of all, a word about the presentation of your sheet. You have probably noticed that it isn't quite as neatly laid out as Figure I, and there is a good reason for this.

ViewSheet always arranges labels so they line up with the left-hand side of the slot. Numbers, however, are lined up – or justified – with the slot's right-hand edge. This is usually quite convenient, but can sometimes spoil the appearence.

You can easily change the justification of any label by placing the cursor at the slot you want to change and typing Func+W.

This will toggle a label between left and right justification, and if you wish – it has no effect on the sheet – you can move down column B right-justifying the labels as I have in Figure I.

The idea behind Clever Soft's sheet is to monitor the company's monthly profits and losses in an easily readable way. Notice that as yet we have only one product to deal with, which makes the principles involved a lot easier to grasp.

The product is a game entitled Alien Shootup, and as you can see from the sheet, is intended to retail for £9.95.

You can also see that the programmer is to be paid royalties at the rate of 15 per cent – not 15 per cent of the profits, but 15 per cent direct from sales. Again, this makes the setup more workable.

The artwork is going to cost £500, which is basically the airbrush artist's commission for designing the disc inlay card.

Production cost is £3.95 per disc, made up from the cost of each floppy disc plus its packing cost – which includes the cost of a plastic disc folder and the duplication of one colour inset card – plus transport costs to the retail outlets.

Below all these costings are the sales figures for the previous month, January, partially filled in.

A total of 600 Alien Shootup games were produced, but only 350 were bought in the shops.

What we now have to do is find out just how much money was lost, or gained, during that month.

Firstly we need to work out the total cost of producing 600 discs of Alien Shootup. The result will go in slot C13, so move to this position ready to input the formula.

This part is quite easy – we know we have to pay £500 to the artist, so this will be at the start of the formula.

Next we multiply the number of discs made – in slot C12 – by the unit production cost for each disc – found in slot C6, and

```
LA  SLOT=A1
CONTENTS=CLEVER

A       ....A....B....C....D....E....F....G....H....I
....1 [A1]CLEVER SOFT   LTD
....2
....3 PRODUCT    NAME:   ALIEN SHOOTUP
....4 AUTHORS  %ROYLTY:    15
....5 ARTWORK  COSTS:     500
....6 PRODCTN    COST:    3.95
....7 RETAIL    PRICE:    9.95
....8
....9 -------- -------- --------
...10 SALES    FIGURES   (JAN)
...11
...12 UNITS      MADE:     600
...13 OVERALL    COST:
...14 UNITS      SOLD:     350
...15 GROSS    INCOME:
...16
...17 GROSS    PROFIT:
...18 NET      PROFIT:
...19 -------- -------- --------
```

Figure I: The spreadsheet after entering Listing I

add it to the £500. Therefore our final formula is simply:

```
500+C12*C6
```

Type it in and press Return. Immediately you should see the value 2870 appear in slot C13. This is how much it cost to make January's batch of discs.

Now we must enter the gross income into slot C15. This is the total cash gained from sales before anything is removed, and again this is straightforward.

Simply multiply the units sold – slot C14 – by the retail price per disc – slot C7 – to come up with the formula:

```
C14*C7
```

Entering this should result in the figure 3482.5 appearing in slot C15, and we can see straight away that there is a profit – not a large one, but a profit nevertheless.

We can't tell yet what the final picture will be, as we haven't calculated the exact profit. To do this we need to subtract the overall cost – slot C13 – from the gross income – slot C15 – and enter the result in slot C17. The formula is therefore:

```
C15-C13
```

so move to slot C17 and enter it in.

Now we can begin to see things happening. The value shown is just 612.5, and we haven't even paid the poor author yet! This last calculation will be the trickiest so far, so I will explain exactly what is involved.

The author, if you remember, is destined to collect 15 per cent of the gross income – not the profit – and to obtain a percentage of a value we divide the percentage by 100 and then multiply it by the value.

Now as the author's royalty percentage is in slot C4, and the gross income is in slot C15, the first part of the formula is:

```
(C4/100)*C15
```

Note the perfectly legal use of brackets to stop the multiplication from occurring between the wrong parts of the equation.

This on its own is insufficient, however. We have found out how much to pay the author, but that is not what we want here. Our final calculation, in slot C18, must be the net profit – the original profit minus the author's royalties.

We must therefore amend the final equation to:

```
C17-((C4/100)*C15)
```

which is absolutely identical apart from the fact that the result has now been subtracted from the gross profit in slot C17. Again, note the brackets which keep the subtraction directed at the whole of the right-hand section.

If you haven't done so already, move to slot C18 and enter this formula. You will see the final value appear, which should be 90.125.

Your sheet should now look like Figure II, and we can finally see exactly what we are left with – less than £100.

By now you may be thinking that this is all very well if you want a detailed post-mortem performed on your company's accounts every month, but what real use is it? The answer is prediction.

From now on, Clever Soft can simulate the sales results of any month in the future by inserting experimental values in various slots, and seeing what the crystal ball has to say.

For instance, if you move to slot C6 – which holds the production cost for each disc package – and enter the value 2 instead of the previous 3.95, you may well be astonished to see that the net profit immediately shoots up to well over £1000.

Using this kind of experimental prediction, Clever Soft can see just how profitable it would be to find a cheaper packaging company, or a cheaper artist, or to raise the retail price.

All of these effects can now be monitored well into the future, so long as the spreadsheet is an accurate enough model of your business.

Our sheet is of course quite simplistic in its outlook, but it still contains more than enough detail for us to expand upon in the coming months.

● *Next month I'll show you how to extend your sheet further, and produce a bar chart of the year's profits.*

```
LA  SLOT=A1
CONTENTS=CLEVER

A       ....A....B....C....D....E....F....G....H....I
....1 [A1]CLEVER SOFT   LTD
....2
....3 PRODUCT    NAME:   ALIEN SHOOTUP
....4 AUTHORS  %ROYLTY:    15
....5 ARTWORK  COSTS:     500
....6 PRODCTN    COST:    3.95
....7 RETAIL    PRICE:    9.95
....8
....9 -------- -------- --------
...10 SALES    FIGURES   (JAN)
...11
...12 UNITS      MADE:     600
...13 OVERALL    COST:    2870
...14 UNITS      SOLD:     350
...15 GROSS    INCOME:   3482.5
...16
...17 GROSS    PROFIT:   612.5
...18 NET      PROFIT:   90.125
...19 -------- -------- --------
```

Figure II: The final spreadsheet

Much more for your money

ROBIN NIXON ends his series by doubling the number of displayable characters in Modes 1, 2 and 5

OVER the past two articles we have covered ways of exploding the Electron's character set to print our own characters on an Epson compatible printer. Now we're going to take a look at exploding squashed characters.

Have you ever found that although Mode 2 is ideal for multicoloured graphics the text is far too big to read easily?

Using this month's utility you will be able to have up to 40 characters per line in Mode 2, or 80 in Mode 1.

Characters are made up from an 8 x 8 grid, as shown in Figure I. However, with a bit of jiggery pokery it is possible to design a complete character set using only a 4 x 8 grid. Figure II shows the idea.

Program I sets up the new 4 x 8 definitions for the numerical, upper case and lower case fonts. Type it in and run it. If you have made any errors while entering the data you will be able to fix them quite quickly using the character definer presented with the first article in this series.

As Program I saves the data while it runs, be sure you have a blank tape or a disc to hand with enough room on it.

Having saved the data – and Program I – type in Program II. This is the routine which handles the new character set.

I suggest you save it before you run it as any typing mistakes could produce some unpredictable effects.

The program works by making the operating system think that there are twice the usual number of characters per line and that each one is half as wide as it actually is. This is achieved by altering the contents of &34F, the location used by the Electron to tell it how many bytes make up a character. In Mode 2 this is 32.

So if we replace this with a new value of 16, the micro will assume that the characters are only half as wide as they really are.

However the computer still thinks there are the normal number of charac-

*** DISC SOFTWARE FOR THE ACORN ELECTRON & ADFS ***

SUPREME TEAM – Simply the best football manager ever produced

A whole new dimension in play provided by over 100k of programs and files on one three-and-a-half inch disc making use of the ADFS's best features

JUST A FEW OF THE FEATURES:-

* 40 player data-base * Yellow and red cards (sendings off) * named goalscorers and * leading scorers chart * capped players * two substitutes * contract negotiation * penalty shoot-outs * classified check (both divisions) * full 64-team cup-draw listings * man of the match * sackings * form-guide * line graphs * in-depth status report * end of season big prize money * fixture list * stadium capacities and * admission prices setting * data-change utilities * compaction utility

Included is a comprehensive 32 page play-guide

SUPREME TEAM is ONLY £9.95 (all inclusive)

INFORMATION DISPLAY SYSTEM (3.5" disc & ADFS)

FEATURED IN THIS MONTH'S ELECTRON USER

A business utility which simulates view-data systems such as CEEFAX and ORACLE. Allows you to create and store up to 700 pages of information and display these pages in news-reel fashion. Included are page editing, cataloguing and diversion programs – all "MENU" operated.

Also, create and display your own user-defined graphics and use them in your pages. Pages can be printed making this package immensely useful in EDUCATION and RETAIL for customer information purposes etc. . .

INFORMATION DISPLAY SYSTEM is ONLY £7.95 (all inclusive)

Cheques/postal orders should be made payable to PETER REYNOLDS and sent with name and address to:-

TOUCHLINE COMPUTERS,

2 ASHE ROAD, STOCKINGFORD, NUNEATON, WARWICKSHIRE CV10 8PR

Tel:- 0203-370359

ROM/RAM EXPANSION BOARD 2 for the PLUS 1

Sideways

will hold 7 ROMS or 6 ROMS plus 16k RAM

.fits inside the plus1 .easy to fit yourself .clear instructions given

.write protect switch .only five leads to solder on, connector to board

.plugs into plus1 rom socket .ours working with 64k Electron & dual discs

.options: with 16k ram (2·6264) £37·50 .without ram £30·95

1MHz BUS & ROM BOARD

.plugs into any cartridge slot . 2 rom sockets

.standard idc bus connector (as BBC)

.£17·95 .gold plated edge contacts

all prices incl. no more to pay (UK)

enquiries tel. 0703-260900 (best after 3pm)

36 Sarum Road, EASTLEIGH, HANTS, SO5 2AN.

R.O.D.H. Designs

PANASONIC KX-P1081

Impact Dot Matrix Printer

£148 THE IDEAL P.C COMPANION

KX-P1081 Highlights

- Near letter quality printing in all pitches
- Operator-accessible print mode selector (Std/Pgm., NLQ, Comp.)
- DIP Switch selectable IBM printer emulation
- Friction feed and adjustable tractor are standard
- Word processing functions (Justification, Centering L&R alignment)
- Proportional Space Printing
- High resolution dot-addressable graphics
- Up to 40 downloadable characters

We are the main SLOGGER stockist in Avon & Wells

We carry all Acorn products including New Archimedes. We are also the main stockists for Amstrad, Commodore, Atari, Opus and many many more

Special Offers

Acorn Cassette Player	£24.95
Acorn/Electron	£59.95
BBC Master	£399.00
Archimedes	from £699.00

A C E

AVON COMPUTER EXCHANGE

Prices Exclude VAT & Delivery

Export & Trade Enquiries Welcome

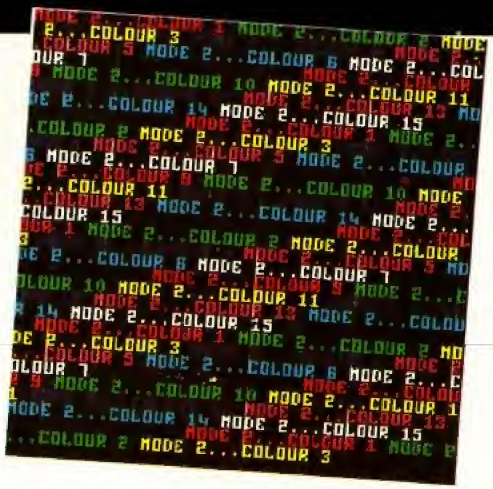
42 Cannon St., Bedminster, Bristol Tel: (0272) 637981

3 North St., Bedminster, Bristol Tel: (0272) 666341

126 Church Rd., Redfield, Bristol Tel: (0272) 542116

87 City Rd., Cardiff Tel: (0222) 483069

31A Farington Rd., Swindon Tel: (0793) 512074



ters per line, even though they are half the size.

It thinks this because location &30A, which contains one less than the number of characters per line, is set to a default value. So all we need to do is poke &30A with the new number of characters a line minus one.

To use the program set HIMEM in line 60 to the lowest value required by your program. If you will be using Mode 1 or 2 this should be &3000. If you'll only be using Mode 4 or 5 it should be &5800.

Then when you need one of the new modes simply type one of the following to select one of the new modes:

```
PROCmode1a
PROCmode2a
PROCmode5a
```

These modes can even be selected from within procedures.

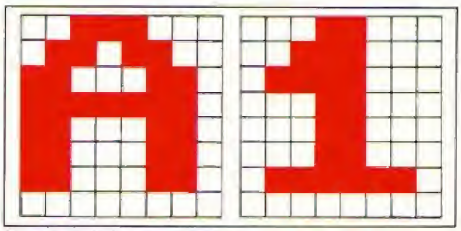


Figure I: 8 x 8 character definitions

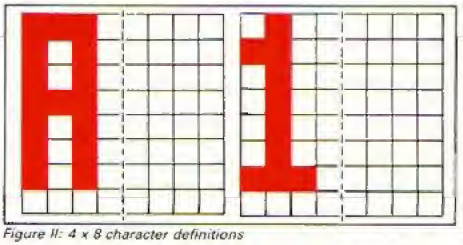


Figure II: 4 x 8 character definitions

● *And that rounds off this series on customising your own character set. I look forward to seeing some* Electron User *submissions making use of these extra features.*

Program I

```
10 REM Slim Characters
20 REM
30 REM By Robin Nixon
40 REM (c) Electron User
50 REM
60 MODE6
70 *FX20
80 PROCread
90 *SA. SMALL-N C00 D00
100 PROCread
110 *SA. SMALL-U C00 D00
120 PROCread
130 *SA. SMALL-L C00 D00
140 END
150 DATA 0,0,0,0,0,0,0,0
160 DATA 4,4,4,4,4,0,4,0
170 DATA A,A,A,0,0,0,0,0
180 DATA 0,A,E,0,E,A,0,0
190 DATA 4,E,C,4,6,E,4,0
200 DATA A,2,4,4,8,A,0,0
210 DATA A,E,A,0,A,4,A,0
220 DATA 2,6,4,0,0,0,0,0
230 DATA 4,8,8,8,8,8,4,0
240 DATA 4,2,2,2,2,2,4,0
250 DATA 0,4,E,4,E,4,0,0
260 DATA 0,4,4,E,4,4,0,0
270 DATA 0,0,0,0,0,4,4,8
280 DATA 0,0,0,E,0,0,0,0
290 DATA 0,0,0,0,0,4,4,0
300 DATA 2,2,4,4,8,8,0,0
310 DATA 4,A,A,A,A,A,4,0
320 DATA 4,C,4,4,4,4,E,0
330 DATA E,A,2,E,8,8,E,0
340 DATA E,A,2,4,2,A,E,0
350 DATA 8,8,A,A,E,2,2,0
360 DATA E,8,E,2,2,A,E,0
370 DATA E,A,8,E,A,A,E,0
380 DATA E,2,2,2,2,2,2,0
390 DATA E,A,A,4,A,A,E,0
400 DATA E,A,A,E,2,A,E,0
410 DATA 0,4,4,0,0,4,4,0
420 DATA 0,4,4,0,0,4,4,8
430 DATA 0,2,4,8,4,2,0,0
440 DATA 0,0,E,0,E,0,0,0
450 DATA 0,8,4,2,4,8,0,0
460 DATA E,A,2,6,4,0,4,0
470 DATA E,A,A,E,8,A,E,0
480 DATA E,A,A,E,A,A,A,0
490 DATA C,A,A,C,A,A,C,0
500 DATA E,A,8,8,8,A,E,0
510 DATA C,A,A,A,A,A,C,0
520 DATA E,A,8,C,8,A,E,0
530 DATA E,A,8,C,8,8,8,0
540 DATA E,A,8,A,A,A,E,0
550 DATA A,A,A,E,A,A,A,0
560 DATA E,4,4,4,4,4,E,0
570 DATA E,2,2,2,2,A,E,0
580 DATA A,A,C,C,A,A,A,0
590 DATA 8,8,8,8,8,A,E,0
600 DATA A,E,E,A,A,A,A,0
610 DATA A,A,E,E,E,A,A,0
620 DATA E,A,A,A,A,A,E,0
630 DATA E,A,A,E,8,8,8,0
640 DATA E,A,A,A,A,C,2,0
650 DATA E,A,A,E,C,A,A,0
660 DATA E,A,8,E,2,A,E,0
670 DATA E,4,4,4,4,4,4,0
680 DATA A,A,A,A,A,A,E,0
690 DATA A,A,A,A,A,A,4,0
700 DATA A,A,A,A,E,E,A,0
710 DATA A,A,A,4,4,A,A,0
720 DATA A,A,E,4,4,4,4,0
730 DATA E,A,2,4,8,A,E,0
740 DATA E,8,8,8,8,8,E,0
750 DATA 8,8,4,4,2,2,0,0
760 DATA E,2,2,2,2,2,E,0
770 DATA 4,E,A,0,0,0,0,0
780 DATA 0,0,0,0,0,0,0,E
790 DATA E,A,8,8,4,8,E,0
800 DATA 0,0,E,2,E,A,E,0
810 DATA 8,8,E,A,A,A,E,0
820 DATA 0,0,E,A,8,A,E,0
830 DATA 2,2,E,A,A,A,E,0
840 DATA 0,0,E,A,E,8,E,0
850 DATA B,0,E,8,C,8,8,0
860 DATA B,0,E,A,A,E,2,E
870 DATA B,8,E,A,A,A,A,0
880 DATA 4,0,C,4,4,4,E,0
890 DATA 2,0,6,2,2,2,A,E
900 DATA B,8,A,A,C,A,A,0
910 DATA C,4,4,4,4,4,E,0
920 DATA 0,0,A,E,E,A,A,0
930 DATA 0,0,E,A,A,A,A,0
940 DATA 0,0,E,A,A,A,E,0
950 DATA 0,0,E,A,A,E,8,8
960 DATA 0,0,E,A,A,E,2,2
970 DATA 0,0,E,A,8,8,8,0
980 DATA 0,0,E,8,E,2,E,0
990 DATA 4,4,E,4,4,4,6,0
1000 DATA 0,0,A,A,A,A,E,0
1010 DATA 0,0,A,A,A,4,4,0
1020 DATA 0,0,A,A,E,E,A,0
1030 DATA 0,0,A,A,4,4,A,0
1040 DATA 0,0,A,A,A,E,2,E
1050 DATA 0,0,E,2,4,8,E,0
1060 DATA 2,6,4,C,4,6,2,0
1070 DATA 4,4,4,0,4,4,4,0
1080 DATA 8,C,4,6,4,C,8,0
1090 DATA A,E,8,0,0,0,0,0
1100 DATA 0,0,0,0,0,0,0,0
1110 DEFPROCread
1120 FOR X%=224 TO 255
1130 VDU 23,X%
1140 FOR Y%=1 TO 8
1150 READ A$
1160 Z%=EVAL("&"+A$)*&10
1170 VDU Z%
1180 NEXT
1190 NEXT
1200 ENDPROC
```

Program II

```
10 REM Squash
20 REM By Robin Nixon
30 REM (c) Electron User
40 HIMEM=&3000
50 *LOAD SMALL-N 900
60 *LOAD SMALL-U A00
70 *LOAD SMALL-L C00
80 PROCmode2a
90 FOR X%=1 TO 50
100 COLOUR X%
110 PRINT "MODE 2...COLOUR
";X% MOD 16;" ";
120 NEXT
130 PRINT
140 END
150
160 DEF PROCmode1a:VDU 22,
1:?&30A=79:?&34F=08:PROCmode
change:ENDPROC
170 DEF PROCmode2a:VDU 22,
2:?&30A=39:?&34F=16:PROCmode
change:ENDPROC
180 DEF PROCmode5a:VDU 22,
5:?&30A=39:?&34F=08:PROCmode
change:ENDPROC
190 DEF PROCmodechange:?&3
67=&7D:?&36B=&9:?&369=&A:?&3
6A=&C:ENDPROC
```

BBC/ELECTRON 'IMAGE' V.2

'IMAGE' was the ultimate tape back up system, now, it's even better

You can be completely assured that this is the best and most able program of its type available. It can deal with:

- Locked programs
- Programs of any length
- 300† and 1200 BAUD
- Files
- ?'s (Ctrl codes) in Filename
- Multiple back ups
- False or trick block info.
- Changing Filenames†
- Continous data stream†
- Locking and unlocking programs

It is VERY IMPORTANT INDEED purchasers take note that 'IMAGE' is for sale strictly for making BACK-UPS of your own software for your own use, for protecting your own programs, or as an aid to putting software on disk (by removing locks from tape software). Any person found using the program for illegal purposes runs the risk of being prosecuted.

To receive your copy of 'Image' send a cheque or P.O. for the sum of

An Astounding £5.80 to:

Peter Donn, Dept. EU, 18 Tyrone Road, Thorpe Bay, Essex SS1 3HF

Please state BBC or Electron version. V1 owners can obtain V2 by sending £1.50 + V1 without case † BBC version only

AA269

KOSMOS

Whatever your subject...

French, First Aid, Football, Spelling, Science, Spanish, Sport, Scotland, England, English Words, German, General Knowledge, Geography, Italian, Arithmetic, Natural History.

Let your computer help you learn

Write or phone for a FREE 20 page illustrated catalogue of our Leisure and Educational Software

KOSMOS SOFTWARE LIMITED
FREEPOST (no stamp needed)
DUNSTABLE, Beds. LU5 6BR
Tel: 05255 3942 or 5406

ADVERTISERS INDEX

21st Software 10
Ace 60
Allen James Computers 54
ASL 22
Centec 12
Database Software 19
Delta Computers 24
Electron & BBC Micro User Show 31
Epic Software 54
Impact Posters 63
Jafa Systems 42
Kosmos 62
Larsoft 54
Lightspeed Software 54
Mandarin Software 37
Mithras Software 62
Peter Donn 62
PMS 62
Pres 4
Project Expansions 42
Qualsoft 39
RODH Designs 60
Slogger 16,17
Software Bargains 7
Superior Software 2,64
Touchline Computers 60
Towerhill 8
Tynesoft 38

MITHRAS SOFTWARE

Best selling software for your Electron at Bargain prices
New titles available from day of release

	RRP	Ours
Tetris	8.95	6.95
Skirmish	9.95	7.50
Kourtyard	9.95	7.50
Impact	9.95	7.50
Bouldersash	9.95	7.50
Indoor Sports	9.95	7.50
Winter Olympiad '88	9.95	7.50
10 Computer Hits Vol. 4	9.95	7.50
Five Star Games Vol. 3	9.95	7.50
Star Wars	9.95	7.50
Ziggy	8.95	6.95
Ransack	9.95	7.50
Despatch Rider	8.95	6.95
Bonecruncher	9.95	7.50
Play it Again Sam	9.95	7.50
Palace of Magic	9.95	7.50
Crazee Rider	9.95	7.50
Codename: Droid	9.95	7.50
Elixir	9.95	7.50
Spellbinder	9.95	7.50
Superior Collection Vol 3	9.95	7.50
Around World 40 Screens	6.95	5.50
The Life of Repton	6.95	5.50
XOR	9.95	7.50
Paper Boy	9.95	7.50
Power Pack 2	9.95	7.75
Spy vs Spy	9.95	7.50
Spitfire 40	9.95	7.75
Evening Star	9.95	7.50
Micropower Magic 2	7.95	6.50
Colossus Chess	9.95	7.75
Graham Gooch Test Cricket	9.95	7.50
Football Manager	–	2.99
Soccer Boss	–	1.99
Warehouse	–	2.99
Plan B2	–	2.95
5 Computer Hits	–	2.95
Impossible Mission	–	3.50

	RRP	Ours
Rick Hanson Trilogy	23.95	15.50
The Lost Crystal	11.95	10.50
French on the Run	9.95	7.50
The Quill	16.95	12.95
The Hunt	9.95	7.50
Village of Lost Souls	9.95	7.50
Project Thesius	9.95	7.50
Mysteria	9.95	7.50
Kayleth	7.95	6.50
Dabridge	7.95	6.50
Kat Trilogy	9.95	7.50
Wheel of Fortune	5.95	5.25
Castle Frankenstein	4.95	4.50
Quest for Holy Grail	4.95	4.50
Kingdom of Klein	4.95	4.50
Suds	–	3.95
American Suds	–	3.95
Carry on Suds	–	3.95
Rising of Salandra	–	4.50
The Nine Dancers	–	3.65
Wychwood	–	3.65
The Puppet Man	–	3.65
Heat	–	3.65
Circus	–	2.50
Perseus and Andromeda	–	2.50
Escape from Pulsar 7	–	2.50
Stranded	–	2.50
Scott Adams Scoops (3 Adv)	–	2.95
DISCS	5.25"	3.5"
Bonecruncher	9.95	–
Spellbinder	9.95	–
Elixir		12.50
Life of Repton	6.50	–
Play it Again Sam	9.95	12.50
Palace of Magic	9.95	12.50
Crazee Rider	–	12.50
Codename: Droid	–	12.50
Tetris	10.50	–

A full list of our Electron titles is sent with each order

ALL PRICES INCLUDE VAT & P&P IN UK. ORDERS NORMALLY DESPATCHED WITHIN 24 HOURS OF RECEIPT BY FIRST CLASS POST BUT PLEASE ALLOW 7 DAYS

(Orders to Europe and Eire add 50p for each item. Worldwide add £1 for 1st and 50p for each other item. Please send cheque payable through a UK bank or give full details of your Visa, MasterCard or Eurocard).

Please Quote Electron (A BBC list is available on request) and send cheque, P.O., Access or Visa number and cardholder's name to:

MITHRAS SOFTWARE
PO Box 151, Maulden, Bedford, MK45 2YH
Tel: (0525) 402630

PMS MULTI-FONT NTQ

Near Text Quality Typesetting Software

NEW ELECTRON VERSION — See you at the BBC Show Manchester

"Quite simply the best font software available for the BBC" – NTQ users say it – the reviewers agree –

If you want to produce quality worksheets, newsletters, OHP slides, menus, leaflets, concert programmes and tickets, exam papers, reports, invoices or just add style to your personal letters – NTQ's for you.

Use NTQ with VIEW, WORDWISE, WORDPOWER or BASIC with ANY EPSON compatible printer (MX and FX).

FONT LIBRARY CONTAINS OVER 50 HIGH QUALITY FONTS – standard typefaces + foreign languages + maths/science symbols + fancy styles.

Write or phone for leaflet, full list of fonts and sample printout.

MIX FONTS, HEIGHTS WIDTHS AND PITCHES IN ONE LINE OF TEXT – just like this.

MULTI-HEIGHT
MULTI-FONT
BACKGROUNDS
AбAÆÇèâöûûèíe

MULTI-WIDTH
MULTI-PITCH
INVERSE
α<±÷×√≠≡≠~≈♩♪

ONLY £24.95 inc VAT (add £1 carriage)
NTQ is 2 roms + disk + user guide

PMS

Permanent Memory Systems
38 MOUNT CAMERON DRIVE
EAST KILBRIDE G74 2ES
SCOTLAND

03552-32796 (24 Hour)

Membership is FREE

THE IMPACT GAMES CLUB

The Fastest Growing BBC Micro & Acorn Electron Games Club in Britain

NEW

TETRIS
(Mirrorsoft)

A new world from Russia. Now available for the BBC and Electron computers.
"One of the alltime computer classics . . . unbelievably addictive . . . it's perfectly simple and simply perfect." Zzap 64.

6 month's membership is absolutely FREE when you buy any of the games on this page.

What you get:

1. At least *20% discount* on the latest major games releases (often more).
2. Monthly catalogues with details of:
   a) The latest releases for the BBC & Electron Micros
   b) The latest posters of your favourite games at less than ½ price
   c) Free to enter prize competitions
   d) Amazing scoop purchase offers.
3. Hints, Tips and Game Solutions available to help you get more from your games.
4. Superb service — 48 hour despatch and prices inclusive of VAT and P&P

PLEASE NOTE — Members are under NO obligation to make any further purchases.

NEW

QUEST
(Superior Software)

A massive arcade adventure featuring all the elements which you loved in Citadel. Great puzzles, some great humour, Superior at its best.

NEW

PRO GOLF
(Atlantis)

BBC/Electron Cassette
Only £2.99

Tutankhamun's Revenge
(Bugbyte)

BBC 5¼" Disc
Only £6.35

NEW

PLAY IT AGAIN SAM 2
(Superior Software)

4 Classic games:
1. REPTON 3
2. CODENAME: DROID
3. CRAZEE RIDER
4. GALAFORCE

AMAZING OFFERS

ELECTRON CASSETTES	BBC CASSETTES	BBC 5¼" DISCS
PHANTOM COMBAT THRUST **Only £4.95 each**	REVS & REVS 4 TRACKS AVIATOR SNOOKER **Only £4.95 each** **Any 2 only £7.95**	ELITE REVS & REVS 4 TRACKS **Only £7.95 each** **Both for only £12.95**

TITLE & PUBLISHER	BBC or Electron Cassette	BBC (or Electron) 5¼" Disc	Master Compact (or Electron) 3½" Discs
		(* = Electron disc available)	
SUPERIOR			
Quest	7.50	9.50	11.95
Play It Again Sam 2	7.50	9.50	11.95
Bonecruncher	7.50	9.50*	11.95
Spellbinder	7.50	9.50*	11.95
Play It Again Sam	7.50	9.50*	11.95*
The Life of Repton	5.50	6.35*	7.50
Elixir	7.50	9.50*	11.95*
Palace of Magic	7.50	9.50*	11.95*
Repton Around The World	5.50	6.35	7.50
Crazee Rider	7.50	9.50	11.95*
Codename: Droid	7.50	9.50	11.95*
Grand Priz Cons. Set (BBC Only)	7.50	9.50	11.95
Repton 3	7.50	9.50	11.95
Revs & Revs 4 Tracks (BBC Only)	10.35	11.95	15.95
Elite	10.35	11.95	15.95
Acornsoft Hits Vol. 1 or 2	7.50	9.50	11.95
Superior Coll. 1 or 2 (BBC Only)	7.50	9.50	11.95
Superior Coll. 3 (Elec Only)	7.50	—	11.95*
TYNESOFT			
Winter Olympiad '88	7.50	11.95	11.95
Spy vs Spy	7.50	11.95	11.95
The Big KO	6.35	10.35	10.35
Boulderdash	7.50	11.95	11.95
Indoor Sports	7.50	11.95	11.95
Phantom	6.35	10.35	10.35
Oxbridge	6.35	—	—
Commonwealth Games	6.35	10.35	10.35
Future Shock	7.50	11.95	11.95
Microvalue (4 games) Elec.	3.99	—	—
Microvalue 2 (4 games) only	3.99	—	—

TITLE & PUBLISHER	BBC or Electron Cassette	BBC 5¼" Disc
ASL		
Ziggy	6.95	8.75
Ransack	7.50	9.50
Despatch Rider	7.50	9.50
Impact	7.50	10.35
BUGBYTE		
Tutankhamun's Revenge	—	6.35
Bugbyte Compilation	—	6.35
Bugbyte Compilation 2	—	6.35
CDS		
Colossus Chess 4	7.50	11.95
Steve Davis Snooker	7.50	11.95
Brian Clough Football	11.95	15.95
DOMARK		
Star Wars	7.50	11.95
The Living Daylights	7.50	10.35
Trivial Pursuit (BBC Only)	11.95	15.95
ELITE		
Paperboy	7.50	11.95
EPIC		
The Lost Crystal	9.50	11.95
HEWSON		
Evening Star	7.50	11.95
Uridium	7.50	11.95
MARTECH		
Tarzan	7.50	10.35
MIRRORSOFT		
Tetris	6.95	10.35
Spitfire '40	7.50	10.35
Strike Force Harrier	7.50	10.35
ROBICO		
The Village of Lost Souls	7.50	10.35
The Hunt	7.50	11.95
Island of Xaan	8.75	10.35

BBC and Electron BUDGET CASSETTES

Only £1.99 each:
Plan B2
Megarock
Microball
Olympic Spectacular
Soccer Boss
Combat Lynx
Millionaire
Cops & Robbers
Rik the Roadie
The Hacker
Licence to Kill
Brian Jacks Superstar Challenge
Eddie Kid Jump Challenge
Creepy Cave
Triple Decker 1
Triple Decker 2
Triple Decker 3
War
Jetpac
Panic

Only £2.99 each:
Pro Golf
League Challenge
Survivors
Football Manager
Cascade (50 games)
Dunjunz
Plan B
Squeakaliser
Templeton
Uranians
Twin Kingdom Valley
Starforce 7
Tennis
Cricket
Hunky Dory
Ice Hockey
Sky Hawk

HOW TO ORDER

Simply fill in the coupon and send with a cheque or postal order to Impact Posters. (Please make payable to Impact Posters).

- Despatch normally same day as order (but please allow 7 days)
- FREE postage & packing (Overseas add £1)

IMPACT Posters

Impact Posters
Neepsend House
1 Percy St.
Sheffield S3 8AU
Tel. (0742) 769950

To: Impact Posters, Neepsend House, 1 Percy St., Sheffield, S3 8AU

Please enrol me for 6 months membership with The Impact Games Club.

Please send me the following games:

TITLE	FORMAT (Cassette etc.)	COMPUTER	PRICE
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

I enclose a cheque/PO for £ _____

*Please note members are under no obligation to make any further purchases.

(BLOCK CAPITALS PLEASE)

Name .....

Address .....

.....

.....

.....

Postcode .....

Featuring 4 Chartbusters

Play It Again Sam 2

SUPERIOR'S BEST COMPILATION YET

for the BBC Micro and Acorn Electron

Sam, an ardent fan of Superior Software's games, has been absolutely delighted by the success of his first selection of chart-topping Superior Software games. Now here's four more games that will keep you enthralled day after day — on that you can rely!

Repton 3 is probably the best-loved of all of Superior's games. Our endearing lizard, Repton, is trapped in a netherworld amidst falling rocks, fearsome monsters and haunting spirits. A superb strategic game which includes character and screen designers enabling you to create your own scenarios. A & B Computing reported: "This is top quality; arcade action at its very best."

Crazee Rider, a fascinating motorcycle-racing game, features seven international racetracks. "It's fast, challenging and there's plenty to keep you entertained. Thoroughly recommended" remarked The Micro User.

Galaforce is the thinking-man's alien-zapping game; fast and furious, yet full of strategy. Oracle enthused: "You haven't lived until you've played this game. Buy it! — it's the ultimate in shoot-em-up. RATING: 20 (out of 20)."

Codename: Droid is a challenging arcade-adventure. The quality of the graphics and animation must be seen to be appreciated. Electron User summed the game up by saying "CODENAME: DROID is brilliant . . . it's worth every penny."

BBC Micro Dual Cassette.....**£9.95** Acorn Electron Dual Cassette.....**£9.95**
BBC Micro 5¼" Disc.....**£11.95** BBC Master Compact 3½" Disc.**£14.95**

(Compatible with the BBC B, B+ and Master Series computers).

THE ORIGINAL **"Play It Again, Sam"**

Our original selection of 4 of Superior's biggest hits for the BBC Micro and Acorn Electron is still available.

- CITADEL
- THRUST
- STRYKER'S RUN
- RAVENSKULL

SUPERIOR SOFTWARE Limited

ACORNSOFT

Please make all cheques payable to "Superior Software Ltd"

VISA

24 HOUR TELEPHONE ANSWERING SERVICE FOR ORDERS

OUR GUARANTEE

- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately. [This does not affect your statutory rights]

Dept. 2PS10, Regent House, Skinner Lane, Leeds LS7 1AX. Telephone: 0532 459453.